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Dairying in Denmark. Comparison with New Zealand.

H. A. Foy, Assistant Inspector of Dairy Products, London.

THE agricultural exhibition held at Copenhagen, Denmark, during June had a special significance to the Danish people in that it was held to commemorate the one hundred and fiftieth anniversary of the emancipation of the Danish peasantry. It was therefore fitting and natural that they should wish to put on record and also to portray the march of progress through the years that have passed since the first step towards liberty was taken.

In order to give some idea of the importance of the celebrations a few details concerning the system as it existed during the latter half of the eighteenth century are given. At this time the Danish peasantry was in a state of subjection. It spent its life in dependence on estate-owners (lords of the manors) and Government officials, and was seldom able to rise above the level of bare existence. Under the feudal system the Danish peasants were grouped in village communities, and the arable land was cut into long narrow strips, which were often cultivated in common.

Liberation of the Peasants.

In 1788 the form of compulsory service which gave the landlords power to conscript every man in the village was done

Interesting comparisons of dairy-farming and butter and cheese manufacture in Denmark with New Zealand practices are given by Mr. Foy, who mentions that New Zealand, although a very formidable competitor of Denmark on the British market, has much in common with that country. He also describes the development of Denmark from feudalism to true co-operation.

away with, and agricultural reform introduced which initiated and regulated the enclosure of the common land. The "villages" were broken up, and the land so divided that each peasant was allotted a section of land surrounding his home. This liberation of the peasants was not accompanied by revolt or bloodshed, but came about through the wise legislation and sound and far-seeing judgment of some of the country's biggest landowners.

Denmark, under the various modifications of the old system, had not prospered,

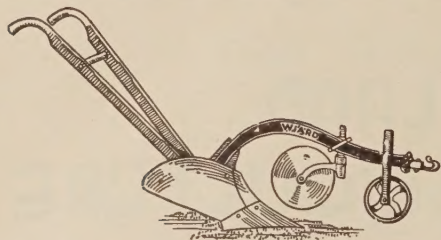
suffering many vicissitudes from time to time. Later history has shown that while the country economically and agriculturally has by no means been free from periods of serious trial, the people themselves have emerged as a race noted for their development of character, education, thrift, and self-reliance. Thus were the foundations laid for the development of Danish agriculture during the nineteenth century and up to the present day.

Under occupying ownership the Danish farmer had to rely on his own resources and enterprise instead of receiving his directions from the landlord. He was induced to carry out improvements on the farm, knowing that he and his children would receive the benefit of his work. This changed system was no doubt largely responsible for the remarkable progress of Danish agriculture. It also naturally facilitated the development of co-operation in all branches of agriculture, which, in turn, has become so vitally important to the welfare of Denmark.

Important Change-over.

During the first decades of the nineteenth century the farmers, through lack of some organized system of finance, were not able to develop their land to anywhere near its possibilities, but gradually better methods of farming became known, and

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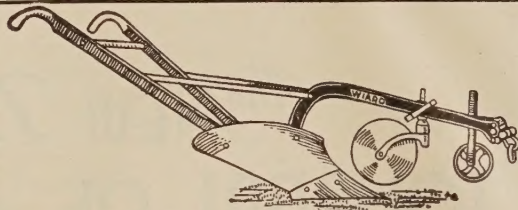
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up to the time of the great competition presented by the United States of America in the grain market (their principal product) became more prosperous. A crisis had arisen, and the situation was saved by the speedy adoption of another form of agriculture. Thus, in the early "eighties" of the last century the great Danish dairy industry replaced grain-growing, and soon quantities of butter, bacon, and eggs were being exported.

True co-operation was now brought into being, and a system rather similar to that which has operated in New Zealand, but perhaps a few years earlier, greatly assisted in the important change-over.

By comparison, New Zealand land-settlement at this time was only being developed, whereas Denmark had been settled for centuries, and the growth of exports in the early stages of factory production was much more rapid. Thus, although the first co-operative dairy was established as recently as 1882 at Hjedding*, with closely allied bacon and poultry co-operation, the following figures show what a flying start Denmark had as compared with New Zealand :—

<i>Butter Exports.</i>			
—		Denmark.	New Zealand.
1881-85	..	15,630 tons av. per annum	3,162 tons av. per annum.

Proportion Farming.

At the time of the abolition of "villénage" in 1788 about 64 per cent. of the people were engaged in agriculture; to-day only 30 per cent., or a little over 1,000,000 people, follow agricultural pursuits. There are some 200,000 farms, a rather remarkable total when one considers that the total area of Denmark is only 17,100 square miles, one-sixth the

*The first co-operative dairy factory in New Zealand was established at Otago Peninsular in 1871.

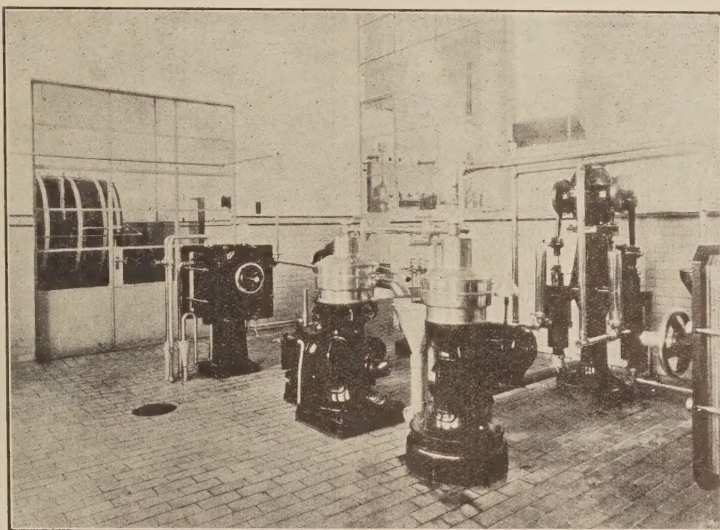


Fig. 1.—Interior of the Funder Butter-factory. Note the absence of belts and overhead pipe-lines.

size of New Zealand. Although, of course, there is a good deal of sandy soil and sand-dunes, hills as we know them do not exist.

Of the 200,000 farms, 51·8 per cent. are between 1 acre and 25 acres, 47·7 per cent. between 25 acres and 300 acres, and about 0·5 per cent over 300 acres. The total number of dairies in 1937 was 1,737, of which 1,409 were co-operative undertakings. Cheesemaking has never figured prominently in Danish dairying, and we were told that prior to 1914 the production was not even sufficient to cover the requirements of home consumption.

The total milk-production of Denmark's 1,600,000 cows is divided into the following channels: For butter, 80 per cent.; for cheese, 3 per cent.; for condensing, 0·5 per cent.; consumed by the producers, 7 per cent.; sold for consumption, 9·5 per cent.

Two Shows Held.

Two shows were held simultaneously. The Agricultural Exhibition was held at Bellahøj, just on the outskirts of Copenhagen, the site being on high ground overlooking the city. The official opening by King Christian X took place in the presence of a large number of people.

The general lay-out of the show at Bellahøj gave the impression of well-organized planning. Its nature differed from an ordinary agricultural show in that, apart from displaying cattle, horses, pigs, poultry, farm appliances, &c., much prominence was given to depicting the historical side of Danish agricultural development during the past one hundred and fifty years. An interesting feature was a completely established small holding, with modern housing and equipment.

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After the opening of the show we were conducted round the most interesting sections by Mr. Sorensen, Agricultural Advisor to the Danish Legation in London. The first striking feature was an area of about 1 acre of ground divided into halves, one-half depicting the state of the land in the late eighteenth century, with actual small plots of poor grass, poor green crops, and models of the old unsanitary type of farm buildings. Conditions to-day were demonstrated by models of modern farm buildings, houses, and a dairy factory, with again small plots of crops, wheat, barley, oats, sugar-beet, &c., but well up to to-day's standard of growth, yield, and health. This presented a very complete picture of the changed conditions between the two eras.

Inspection of Cattle and Pigs.

A more detailed inspection was made of the dairy cattle and pigs. The dairy cattle were displayed very effectively, the construction of the stalls enabling inspection from all sides. Danish Reds predominated, followed by Black and White Jutland cattle, with a few Jerseys and Shorthorns. The percentages of the various breeds in Denmark are as follows: Danish Reds, 60 per cent.; Black and

White Jutlands, 20 per cent.; Shorthorn and Shorthorn crosses, 18 per cent.; Jersey and Jersey crosses, 0.5 per cent.; Dutch and Dutch crosses, 0.5 per cent.

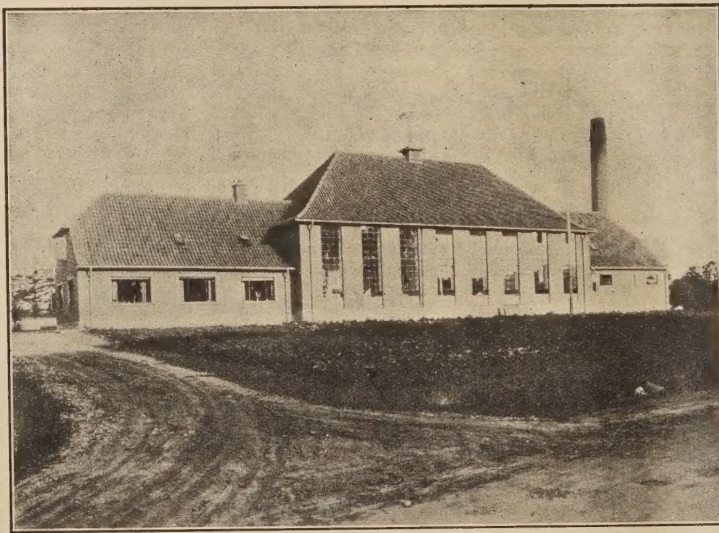


Fig. 2.—The exterior of the up-to-date Demstrup Factory in Denmark.

The large number of Danish Reds exhibited were remarkably uniform in type. These are medium-sized cattle, a little inclined to the dual-purpose type, and deep-bodied and not long. The udder type was interesting, the two quarters from the rear being so pendulous as to appear almost divided, differing greatly from the symmetrical udders of most cows seen in New Zealand. A number of the butterfat records of the cows exhibited were perused, the totals being of credit to any breed in any country. The average fat content was given as approximately 4 per cent.

I was struck with the great uniformity in all the pigs seen, the majority being of the Danish Landrace type, very long, deep-bodied whites. These are the result of much type development for suitability for bacon, and although they were large animals the small shoulders and large hams were quite evident.

The pig industry is very important to Denmark, the total number of pigs being 3,083,000 in 1937, or almost two to every dairy cow. This figure is a little below that for 1936, the reason for the decrease being due, we were told, to the British bacon quota. The New Zealand figure of 802,000 pigs, or 41 per 100 dairy cows, is an interesting comparison.

Trade with New Zealand.

It was interesting to receive comment on all sides concerning the large amount of trade in dairy machinery done in the past with New Zealand, and, although a feeling of regret that this business had fallen off in recent years was expressed, most of the representatives realized that owing to our modification of the general

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system of buttermaking, from the farm and through the factory, such a development was inevitable.

It was also interesting to note the very large variety of small, compact, high-speed refrigerators on show. The question of air-cooling in butter-rooms and cheese-curing rooms appears to be receiving a fair amount of attention. This has particular reference to control of mould in both spheres.

Butter exhibits from nearly fifteen hundred creameries were exhibited, competing in various classes. These were housed in a special glass-sided room at controlled temperatures. I had the opportunity of examining numerous samples, and endeavoured to follow several classes from the highest to lowest scoring butters. The tubs were uncovered, and, as a consequence, the development of surface colour, even at the low temperature, was rapid. The first feature noted was the variation in colour of the butters, some, of course, being slightly artificially coloured, but nevertheless there was more variation than one would have expected from such a small area of country at this time of the year.

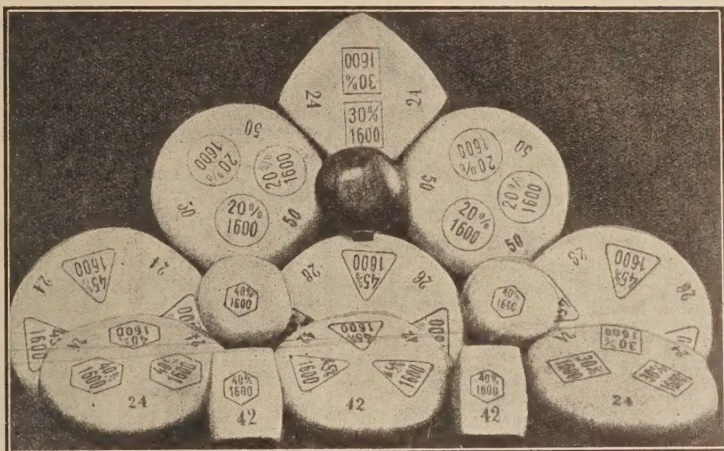


Fig. 3.—Methods of marking various types of Danish cheese.

An interesting feature in connection with the display aspect of the butter exhibits was that when plugs of butter were drawn (the iron being small) the complete plug was thrown away, and consequently the best-quality butters presented a mass of holes. I could hardly

say that this spoiled the appearance altogether, and I must admit that the whole presentation gave a more business-like impression than our glass-covered, apparently untouched exhibits of butter at shows in New Zealand.

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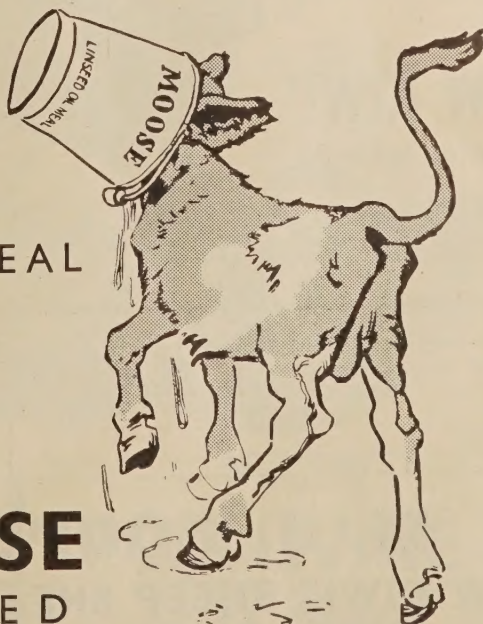
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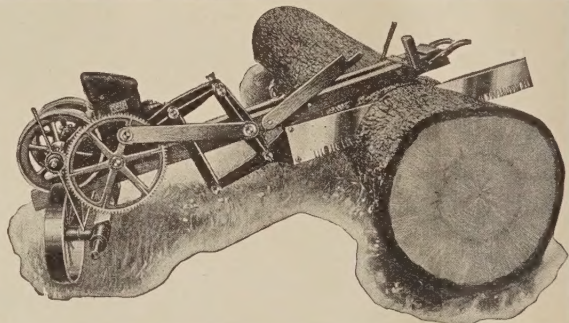
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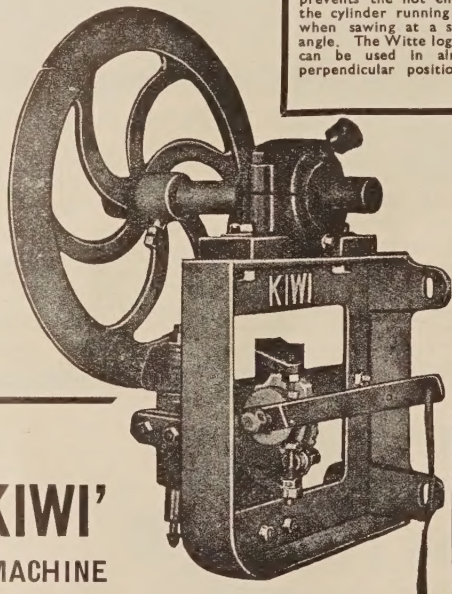
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High-acid Butters.

I have been in England long enough to become accustomed to a certain extent to full-flavoured butter, and therefore the high-acid butters seen did not come as a shock to my palate. I should describe the Gold Medal butters as being very attractive, full, but very clean acid-flavoured samples. There was no suggestion of saltiness, and no harshness. The few butters which received no awards were naturally not so pleasing. The flavours in some of these could perhaps be described as "flat acid"—an impression that the flavour-producing strains of the starter had ceased working. From the New Zealand viewpoint there was perhaps more variation in body and texture than one would expect to see in a show, and one or two of the unplaced butters showed rather weak, salvy bodies.

In another similar room about eight hundred cheese samples were displayed, but there was, of course, nothing of the Cheddar type. All the usual sweet-holed, tough-bodied Continental varieties were on show, but my only particular interest was in the Danish Blue. This cheese, as

a competitor to Gorgonzola, is finding increasing favour on the British market, and is very palatable.

Nearby, in a "dummy" building, all the latest in dairy machinery and design had been co-ordinated to present a modern butter-factory. There was no belting or shafting, each unit having its electric motor. Aluminium was used fairly extensively, especially for cold milk or cream. This is of the hardened type, and is claimed by some to be superior to staybright for certain uses. Included in this factory building was a very up-to-date and fully equipped bath- and shower-room for the factory staff.

Manufacture of Casein.

The manufacture of casein receives a fair amount of attention in Denmark, and this was portrayed very effectively by stands displaying Lanital products. The Lanital was actually fabricated in Italy, but a certain amount of the specially processed casein required for Lanital is produced in Denmark. On these stands were demonstrated the textile casein before mixing with wool, skeins of

the Lanital or finished products, suiting and dress material, and, finally, suits and ladies' costumes. To the casual observer this material was not distinguishable from ordinary worsteds.

Monday, 20th June, was the actual date of celebration, and a civic function, culminating in a ceremony at the Statue of Liberation, was held. This statue stands in the centre of Copenhagen, and bears upon it the inscription :—

"The King ordered the abolition of the villenage and the passing of the effective agricultural laws, so that the free peasant might become a thrifty, enlightened, industrious, good, and happy citizen."

Visit to Factories.

On Tuesday I joined a "dairy" party totalling about forty. English-speaking representatives were greatly in the minority, most delegates using the German language. After sampling four varieties of cheese we proceeded to Hillerod. Unfortunately, owing to the number present and the short time at our disposal, this visit was very hurried, and

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not much more than a quick glance around was possible. The operations of Hillerod Experimental Station are, of course, fairly well known to those connected with the industry in New Zealand. Cheese-making is receiving its share of consideration, but only the "sweet" types are being manufactured. Inquiries made here and also at the stands of firms producing starter-cultures regarding the use of single-strain cultures resulted in strong support for mixed types.

The method of treating starter milk was given briefly as follows: "Selected and specially examined milk heated in metal containers in hot water to 90° C. for thirty minutes. Cans covered, milk stirred frequently, cooled to 18° C., and inoculated with 2 per cent. culture." The young man in charge of this section appeared rather incredulous when asked if any failures were experienced. There are many factors to consider when making comparisons between New Zealand's and Denmark's requirements as to what a starter is expected to do. One would naturally think that Cheddar would be much more exacting than the sweet type of cheese in this respect.

New Type of Churn.

Installed at Hillerod is a new type of churn. This is very similar to a 400 gallon square steel tank suspended from

the diagonal corners. It is constructed of staybright, the chief features claimed being ease of cleaning and ease of operation. However, during the warm weather, and owing also to the fact that churning temperatures are high, trouble is experienced through the butter adhering to the sides of the churn. They have adopted the expedient of fixing up a suspended spray pipe in an endeavour to cool the churn, but this has been only partially successful.

With reference to types of metals used, I was shown a badly pitted staybright cream-vat, and here, apparently, aluminium is favoured for cold liquids. One is led to wonder just what variation exists in qualities of staybright steels.

A visit was paid to a large and efficiently controlled dairy-farm owned by Mr. Madsen-Mygdal, ex-Premier of Denmark. The area of this farm is 400 acres, on which 180 Danish Red cows are kept. All milk is forwarded for liquid consumption to Copenhagen, and the cows are milked by hand four times daily. Bottling is carried out on the premises, and all cows are T.B. tested. Milk is not always pasteurized, but it is cooled, and the average fat content was given as 4 per cent. The main crops are barley, wheat, lucerne, grass, and beet, and they looked in very fine condition.

I do not know how many hands are employed on this farm and in the dairies, but everything inside was spotlessly clean. The average production per cow was stated to be 4,000 kilogrammes, which would be about 352 lb. butter-fat. Concentrates would probably be used during winter months.

Hedelykke Dairy Factory.

The dairy factory at Hedelykke was next visited. This was larger than the average, and very well kept, a feature being the extremely neat flower-gardens and lawns surrounding the buildings. Apart from the manufacture of butter, milk is processed and bottled, the daily intake of 4,000-odd gallons being divided equally between the two uses. The plant was modern, and here again aluminium was largely used for cream-vats, skim-milk vats, &c. All skim-milk is pasteurized before return to the farm for pig and poultry feeding, and is generally inoculated with a small percentage of starter at the factories.

The total staff of the factory was thirteen hands, which sounds excessive according to New Zealand standards, but all milk for butter is separated at the factories. Skimming requires some attention, and here the bottling makes heavy

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DRENCH NOW,
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calls on labour. Assistants' wages were stated to be 61 kroner (approximately £2 16s.) per week of fifty-six hours, one day off each fortnight, and eight days paid holiday each year. If overtime is worked in any week the rate is one and a half times ordinary pay.

Cream glazed tiles around the walls and cream tiled floors added to the very spick and span appearance of the interior.

Margarine Competition.

During our stay we had a number of informal discussions with various people, including the Secretary for Agriculture, the President of the Association of Dairies, Director of Health, and dairy experts. New Zealand, although a very formidable competitor of Denmark on

the British butter-market, has much in common with that country. The question of margarine competition against butter was one that arose, and on this we should be closely allied. It is rather significant that the Danes are themselves eating more margarine than butter, the figures quoted being 21 kilos of margarine and 9 kilos of butter per head per annum.

Margarine interests are strong in Denmark, as in England, and the strong case made for the value of margarine with its constant vitamin A and D content, plus the economic factor, has evidently caused a large amount of support from the consuming public, in Denmark particularly. This is in spite

of the fact that margarine advertisements in Denmark are not permitted to mention the addition of vitamins.

One can readily understand the usual enthusiasm displayed by visitors to Denmark over the fresh and healthy appearance of the crops, pastures, homes, and gardens. Everything combines to make a permanent impression of thrift, industry, and peacefulness on one's mind, and one feels that the thoughts expressed at the time of the emancipation of the peasants have indeed eventuated.

I should like to record our appreciation of the great hospitality, the courtesy and kindness, and willing assistance shown us by all with whom we came in contact during our visit.

The Dairy - produce (Special Milk Products) Regulations 1938.

A. E. MORRISON, Solicitor, Department of Agriculture.

THE purpose of these regulations is to ensure that manufacturers of certain special milk products containing a substantial quantity of butterfat, such as condensed milk, evaporated milk, "Ankoria" baby-food, &c., shall receive a price, based on the quantity of butterfat purchased for the manufacture of such special milk products, comparable with the prices received by manufacturers of creamery butter which is acquired by the Crown in terms of the Primary Products Marketing Act, 1936.

Accordingly, the Minister of Marketing is required to ascertain in respect of any manufacturing season the average rates per pound of butterfat which the proprietor of a reasonably efficient creamery could have paid for butterfat if purchased for the manufacture of creamery butter for export and sold in the United Kingdom, such average rates to be calculated, first,

on the basis of the guaranteed price, and, secondly, on the basis of the actual selling-prices for creamery butter in the United Kingdom. The average rates so ascertained shall be final and binding on all parties.

If the average rate per pound of butterfat calculated on the basis of the guaranteed price exceeds the average rate calculated on the basis of the actual selling-prices for creamery butter in the United Kingdom, the Minister shall, in respect of the manufacturing season ended on 31st July, 1938, cause to be paid to the manufacturers of the special milk products covered by the regulations, except "café au lait," the difference between such rates computed on the total quantity of butterfat purchased for the manufacture and export of such products, whether exported before or after that date.

In respect of any subsequent manufacturing season in which butterfat is purchased for the manufacture of the special milk products, including "café au lait," the difference between such rates shall be payable to the manufacturers of such special milk products whether the same are exported or sold for local consumption. If, on the other hand, the average rate per pound of butterfat calculated on the basis of the guaranteed price is less than the average rate calculated on the basis of the actual selling-prices for creamery butter in the United Kingdom, the manufacturers of the special milk products are required to pay to the Crown the difference between such rates computed on a like basis.

Copies of the regulations may be obtained from the Government Printer, Wellington, price 3d. per copy, plus postage 1d., remittance with order.

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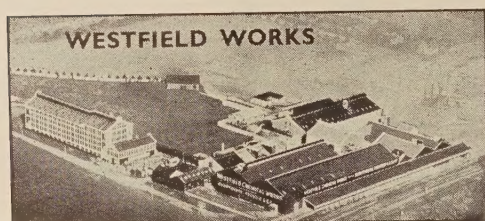
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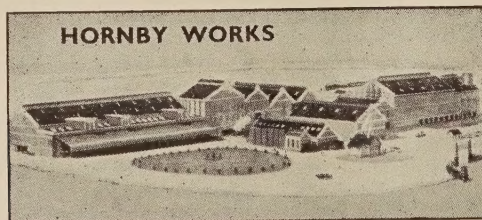
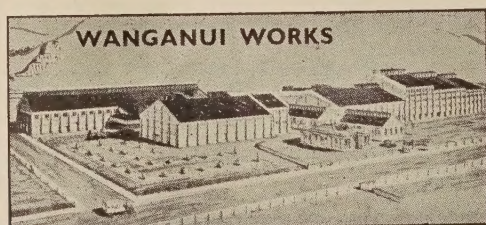
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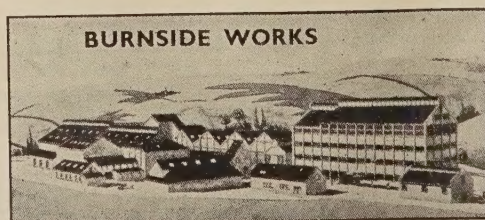
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Making the Most of Top-dressing.

P. S. SYME, Instructor in Agriculture, Warkworth.

APPROXIMATELY 750,000 tons of fertilizers were used by the farmers of New Zealand during the past year. As an annual charge against production the bill is a heavy one, and if the individual farmer is to receive full value for money spent on top-dressing he must himself co-operate in solving the peculiar and varied problems presented by his particular farm.

Advice in this direction, although often of much practical value, can only be general:—

"In New Zealand soils the most common deficiency is phosphate, and the cheapest and most efficient fertilizer is superphosphate—with lime, if necessary. Lime is deficient over large areas, particularly on old leached soils. The addition of potash has not generally been found effective, although it has given excellent results on restricted areas in certain districts. For grassland it is most economically applied in the form of potash salts. The use of artificial nitrogen on pasture is warranted only for special purposes, such as the production of early spring grass. Care and discrimination are necessary to obtain the maximum benefits from nitrogenous fertilizers used for this purpose."

Value of Soil Analysis.

Many farmers place great faith in the chemist, and imagine that an analysis of their soils would provide an accurate and infallible guide for their manurial practice. This idea, although widespread, is erroneous. It should be understood that, while a chemical analysis has proved useful on occasions, its value is frequently very limited, and only in conjunction with information relating to various other factors can it serve as a reliable indicator of soil deficiencies.

An application of 1 cwt. per acre of superphosphate will increase the phosphatic content of the soil by only

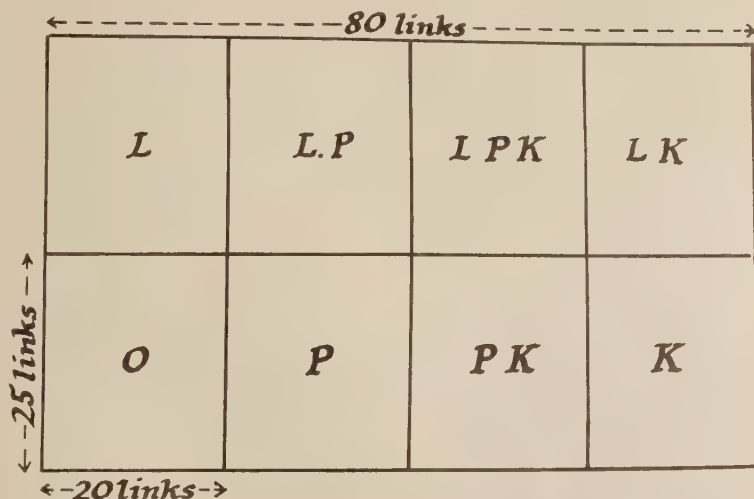


Fig. 1.—A diagram showing the lay-out of a small manurial trial. The following symbols are used: O, control plot; L, lime at 1 ton per acre; P, superphosphate at 3 cwt. per acre; K, potash salts at 2 cwt. per acre.

0.0008 per cent. The chemist could not hope to detect this minute increase, yet 1 cwt. of superphosphate per acre may give an evident visual response.

Experience has shown that the most reliable information is provided by trials on the farm itself. In practice, these trials need not be elaborate, and their cost is negligible. If properly laid down they will prove of considerable interest, and may ultimately point the way to a system of highly efficient and economic manurial practice. From the point of view of the younger members of the farming community such trials are to be strongly recommended, and, if generally adopted, they can provide much matter for discussion and prove of very high educational value.

Lay-out of Trials.

While the best lay-out to be adopted must depend on circumstances, that shown has the merit of extreme simplicity combined with a high degree of efficiency. Such a trial will provide information regarding the response obtained from each of the three classes of fertilizer most likely to prove useful, and a comparison is afforded between the control plot and each of the fertilizers used in conjunction with each other.

In order to be effective such trials must be laid down on carefully selected and uniform soils which are truly representative of the farm, and if, as commonly occurs, the farm comprises a number of different soils a similar trial may be laid down on each, provided the area is sufficient to justify differential treatment.

As an alternative to the small plots the strip system has much to recommend it. Where the intention is simply to try out the effect of lime or potash the

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distributor may be used to broadcast a series of strips across a field when it is receiving its normal top-dressing. These can readily be arranged to provide a comparison showing—(a) Phosphate alone; (b) phosphate and lime; (c) phosphate and potash; (d) phosphate, lime, and potash.

This method has the advantage of covering representative soil types and of being easily carried out in practice. Care should be taken to mark the strips permanently either by drilling to selected marks or by pegging. Otherwise, even marked responses may not be detected.

Measuring the Results.

In measuring the results of any of the above trials the clovers should be regarded as the best indicator plants, as they are highly susceptible to a deficiency of phosphate, lime, or potash. Any improvement in vigour, species, or density should be considered as showing a manurial response, and any signs of preferential grazing should be regarded as significant.

Some time may elapse before responses become apparent where the land has in the past been heavily top-dressed. In regard to lime, it should be pointed out that a response is sometimes delayed even if lime has not previously been applied. Immediate action is to be recommended where positive results are obtained, but when the results are merely negative it is wise policy to suspend judgment.

<i>Phosphates (Normal Dressing)</i>	<i>Lime</i>	<i>Phosphates (Normal Dressing)</i>
<i>Potash</i>	<i>L P K</i>	<i>Potash</i>
<i>Phosphates (Normal Dressing)</i>	<i>Lime</i>	<i>Phosphates (Normal Dressing)</i>

Fig. 2.—A diagram showing the strip method applied on a field scale. The whole of the field receives a normal top-dressing of phosphates, and is then cross top-dressed with lime and potash.

It cannot be too strongly emphasized that where good results are already being obtained any radical change in the manurial policy on a large scale is a speculation rather than an investment. It has been said that advice which costs nothing is usually worth nothing. Advice which may yield a heavy profit to the giver,

however, is doubly suspect, and when it is pointed out that the commission on certain fertilizers may be very high—amounting to as much as five times the commission on superphosphate—any advice regarding the desirability of “giving the land a change” may prove “more blessed to the giver than to the receiver.”

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Records of Interesting Veterinary Cases.

C. V. DAYUS, M.R.C.V.S., District Superintendent, Live-stock Division, Dunedin.

A FEW short notes on the following cases will, no doubt, be of interest to stock-owners, especially as they have all come under the notice of the writer in New Zealand.

Rickets in a Foal (Blenheim District).

The chief feature of rickets in young animals is a derangement of calcium metabolism in which the newly formed bony tissue fails to calcify. This leads to deformity by bending or curvature of



Fig. 1.—Rickets in a foal.

bones. Some doubt still exists as to the true cause of rickets. The principal points considered are a deficiency of calcium, a deficiency of phosphorus, a defective calcium/phosphorus ratio, and a deficiency of vitamin D.

Theiler states that the two important factors concerned in the cause of rickets are vitamin D and phosphorus, and that a deficiency of either of these may lead to the condition. At any rate, there is an inability on the part of bone-forming cells to abstract mineral salts from the blood-stream and use them for the formation of hard, dense bone. Dogs, pigs, lambs, foals, and calves may all be affected with rickets.

In the photograph of this foal the deformity is well marked, and the joints are enlarged and long bones curved.

Prevention of Rickets.

In the prevention of rickets in foals the diet of the mare requires attention in the

selection of foods rich in calcium and phosphorus. Oats with good hay (preferably lucerne or clover hay) and the addition of steamed bone-meal and access to fresh, green pasture should prove an adequate diet. If thought necessary, a tablespoonful of steamed bone-meal could be added to the feed every other day and a wineglassful of cod-liver oil added daily.

It is important that the young animal should be reared in good, clean surroundings and allowed plenty of exercise. If rickets should occur, the mare and foal should be moved to better pasture. The foal should be taught to take additional feed. Oatmeal and bran are easily digested foods, and may be given in small quantities. To this can be added a small quantity of steamed bone-meal and cod-liver oil. In bad cases treatment is difficult, and there may be permanent deformity.

Radial Paralysis in a Horse (Dunedin District).

In Fig. 2 will be seen a six-year-old Clydesdale gelding with radial paralysis, or "dropped elbow." This condition is due to damage to the radial or musculo-spiral nerve, with the result that the muscles of the elbow and knee are incapable of action. This gelding was found dead lame in the off fore leg, having been quite sound the previous evening. It will be seen that the leg appears too long for the body. The toe is in contact with the ground, and the horse moved forward with difficulty and dragged the toe in doing so.

In this case it was thought that the damage to the nerve was due to a fracture of the first rib. During the first three weeks the horse was kept in slings, as he exhibited evidence of considerable pain and greatly resented any manipulatory examination being made. At the end of the next three weeks there was some slight improvement, but no further improvement was noted from expiry of that



Fig. 2.—Radial paralysis in a horse.

period up to the time of the gelding's destruction, some four months later. For the last three months the horse was in a paddock enjoying complete freedom, where he hobbled about with considerable ability, practically on three legs.

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Post-mortem Examination.

Five months after the onset of the condition it was decided to destroy the horse, and subsequently a post-mortem



Fig. 3.—Showing a fracture of the first rib.

examination was made. Fig. 3 clearly shows the fracture of the first rib, and even after the lapse of time no proper

union had taken place. The uppermost nerve to the right of the fracture is the radial, the middle the ulnar, and the lower one is the median, and it will easily be appreciated how closely these are involved in the fracture.

Injury to the radial nerve sometimes occurs in casting horses, especially when this is done on hard ground.

In the case of fracture of the first rib it is suggested that one cause is working horses in double harness, where one of the horses plunges forward into the collar when starting while the other horse hesitates. This particular gelding was not a "rig," but he had the habit of jumping up on other horses, and it is surmized that the injury was derived in this manner.

Several of the simpler types of radial paralysis recover in a few weeks. In the cases due to fracture of the first rib recovery is more prolonged, and, in fact, the animal may eventually have to be destroyed, as happened in this Dunedin case. Little attempt at treatment can be made other than rest, and for this purpose, for a period at least, slings are advisable.

Cellulitis in a Horse (Maniototo District).

A case of cellulitis in a three-year-old horse was seen in the Ranfurly district. This condition is a diffuse inflammation



Fig. 4.—Cellulitis in a horse.

of cellular tissue, in this case occurring in the facial region. It is very similar in appearance to *Purpura haemorrhagica* in horses, and also resembles erysipelas,

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an acute infectious disease involving the skin and subcutaneous tissues which occurs in man. The photograph shows the appearance of the horse's head with diffuse swellings of the lips, face, and nostrils. The eyelids are also swollen, causing the eyes to be kept closed.

It is possible for this type of condition to follow an infectious disease like strangles, or other acute infection of the respiratory or pharyngeal tract. The history on these points was not very clear in this case, but there is no doubt that infection did occur in the facial locality. The animal was finally destroyed, as there was no prospect of recovery.

Melanoma in a Horse (King-country District).

Melanoma is a tumour formation, often malignant, in which the cells contain a brown iron-free pigment known as melanin which is usually derived from the hæmoglobin of the blood.

This pigment occurs naturally in the eye and in the skin and hair. It occurs in the skin in Addison's disease in human subjects, and tumour formation is sometimes associated with "moles" in humans.

Melanotic tumours are often seen in grey horses; they develop in the subcutaneous tissue and form a well-defined swelling. Lesions in horses are generally found near the root of the tail and anus.

"Shivering" in a Horse (Maniototo District).

The photograph accompanying this section illustrates the worst case of "shivering" the writer has ever seen.



Fig. 5.—"Shivering" in a horse.

"Shivering" is a nervous disease characterized by involuntary spasmodic muscular contractions, with consequent irregular movements, generally affecting one or both hind limbs and the tail.

The condition occurs chiefly in heavy horses, but may also occur in light draughts and saddle horses. Shivering is regarded as an hereditary unsoundness, and as such appears in the schedule of unsoundnesses adopted by the Clydesdale Society of New Zealand.

Shivering varies a good deal in degree, and in slight cases it is very hard to

detect. In a well-marked case the muscles of the hindquarters are seen to quiver or tremble when the horse is made to back, a process often difficult and occasionally impossible.

In the case illustrated the horse could not back, and not only were the hindquarters affected, but the forelimbs and face muscles were also affected. Although slight shiverers may work for years the condition is a bad unsoundness, for horses become difficult, as they are unable to back a load and are often not easy to shoe. Shivering is usually a chronic or very slowly progressive affection. There is no curative treatment.

Lamb Carcass with Supernumerary Limb (Ocean Beach).

In the accompanying photograph, for which the writer is indebted to Mr. Norman McGorlick, of Ocean Beach



Fig. 6.—Lamb-carcass with a supernumerary limb.

Freezing-works, will be seen a quite presentable lamb-carcass, showing the development of a supernumerary limb on the left thorax. This is due to an irregularity in development in utero.

Contagious Ecthyma (Tapanui District).

This is a specific infectious disease, characterized by the formation of papules, vesicles, pustules, and scabs on the skin of the lips. Young animals, lambs, and hoggets suffer most from the disease.

The infecting agent is a virus, and the disease occurs in New Zealand and other parts of the world. Once commenced, the infection spreads rapidly, and a high



Fig. 7.—A lamb suffering from contagious ecthyma.

percentage of the mob are usually affected. Natural recovery follows and there is no appreciable mortality, but the loss of condition is a question of some economic importance.

Animals once affected and recovered have a high degree of immunity against further infection. It has been possible to develop a method of vaccination which has given very satisfactory results, and which, where the position warrants it, is quite practical in application. During the last few seasons several thousand lambs have been vaccinated in the Tapanui district with a vaccine prepared at the Department's Veterinary Laboratory, Wallaceville. The operation is quite simple and is done at marking-time.

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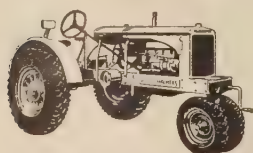
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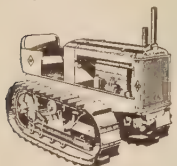
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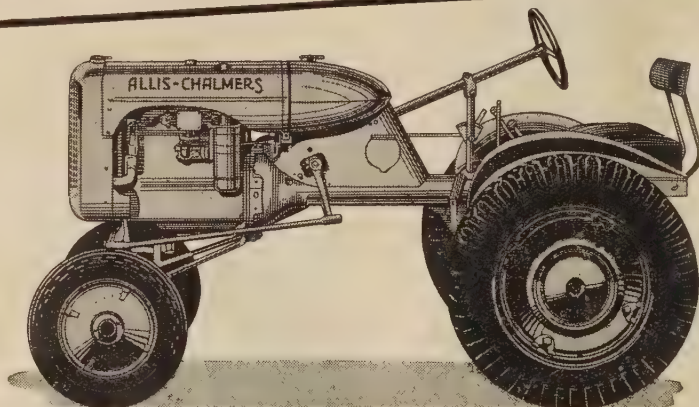
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Control of Feed Flavour by Herd-management.

Results of Trials at Waimate West Demonstration Farm.

J. E. DAVIES, Instructor in Agriculture, Hawera.

INVESTIGATIONS carried out at the Dairy Research Institute, Palmerston North, in connection with feed flavours in cream have shown that under stall-feeding conditions there was a marked reduction in the intensity of the feed flavours when taint-producing feed was given the cows not later than two and a half to three hours before milking. There was also no indication that yield was affected when the cows so fed had an ample ration.

The possibility of applying these findings to herd-management on dairy-farms during the period when feed flavours are likely to be prevalent was considered worthy of further investigation, and it was thought desirable to have some definite information regarding the effect on the butterfat-production of removing the herd from the pastures some two and a half to three hours before milking. For this purpose a trial with the dairy herd of sixty-eight cows at the Waimate West Demonstration Farm in south Taranaki was arranged with the co-operation of the Department of Agriculture and the Demonstration Farm Committee.

Aim of the Trial.

The aim of the trial was to ascertain whether, under average grazing-conditions in which the cows were getting all their feed from the pastures, the removal of the herd three hours before the afternoon milking into a yard or bare paddock would cause any reduction in the yield of milk or butterfat.

A start was made with the trial early in October, when supplementary feeding had been finished and the full herd of sixty-eight cows was in milk. The herd was divided as evenly as possible on an age, time of calving, and known-production basis into two groups of thirty-four. The main grazing-area of the farm was temporarily subdivided, the paddocks being equally divided to give uniform grazing-conditions for each herd. A check trial of ten days showed the herds to be divided as evenly as possible on

A method of reducing feed flavours in cream by herd-management has been tested at the Waimate West Demonstration Farm. Experiments at the Dairy Research Institute showed that there was a marked reduction in the intensity of the feed flavours when taint-producing feed was given not later than two and a half to three hours before milking, and the trials revealed that the herd can be removed from the pastures to a bare yard about three hours before milking without loss of production.

a production basis, and during this period they settled down to grazing and coming in as separate herds.

Management of Herds.

During the trial, which began on 11th October and was completed on 20th March, the herds were grazed each day on adjoining fields which were, in the main, subdivisions of the same original paddock, or, in the case of four larger paddocks, adjoining areas of similar pasture. The only difference in management of the two herds was that one came in from the pasture three hours before the afternoon milking, while the control herd was brought in at the usual time and milked immediately. The herd soon settled down to this arrangement.

It was intended to alternate the procedure by bringing in first one herd and then the other three hours before milking, making the change every twenty days, but on making the change-over the first

time it was found that both herds were considerably upset and at the end of ten days had not settled down. A change back to the first arrangement was then made and was continued throughout the trial.

Returns from Trial.

The following table gives the returns in butterfat for each period of the trial. In order to fit in with testing periods exact ten-day periods were not observed.

Period.	Herd A.—Thirty-four Cows: Ordinary Management.	Herd B.—Thirty-four Cows: Removal from Feed Three Hours before Milking.
October—	lb.	lb.
11th–20th	426.9	425.5
21st–31st	452.7	470.6
November—		
1st–10th	414.5*	441.0*
11th–20th	380.7	416.9
21st–30th	381.8	408.7
December—		
1st–10th	374.8	393.2
11th–20th	371.9	397.1
21st–31st	405.9	415.2
January—		
1st–10th	349.3	357.5
11th–20th	351.4	367.6
21st–31st	376.8	393.3
February—		
1st–10th	333.1	361.6
11th–20th	315.5	323.3
21st–28th	306.2	318.9
March—		
1st–10th	336.3	351.9
11th–20th	314.5	335.4
	5,892.3	6,177.7

* Period when herd-management changed. For this ten-day period only herd B was under ordinary management, and herd A was removed three hours before milking.

The test period of ten days showed that the two herds under the same management were practically even in butterfat-production. The change-over to one herd coming in three hours before milking resulted in no appreciable change in relative production of herd B as compared with herd A. For the next period herd B showed a slight increase in production, which was maintained to the end of the trial. This increase was due to a higher average test, the milk-production of the two herds being remarkably even. It is

interesting to note that the average test of herd B was the same as that of herd A at the commencement of the trial.

Method Indicated.

The result of this trial, which is being repeated to study the effect over another season when feed-supplies may not be so uniformly good, indicates a valuable and easily adopted method of reducing feed flavours on farms subject to this trouble. It is well known that most trouble is given by the evening cream.

If, as the trial indicates, the herd can be removed from the pastures in the afternoons about three hours before milking and can stand in a bare yard or small paddock without loss of production, and if such management is certain to reduce the feed flavour in the evening milk, as shown by the Dairy Research Institute's trials, the farmer has available a method which he can readily put into operation for tackling the problem of cream taint through pastures.



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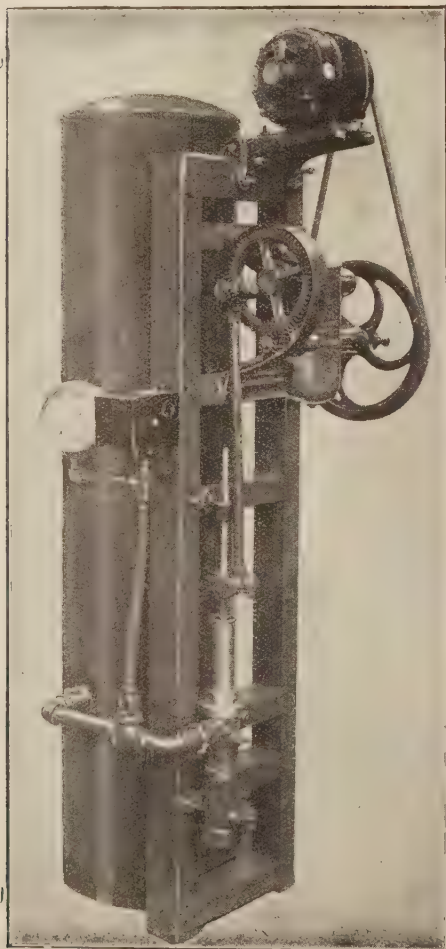
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AS many farmers know to their cost, this winter has been one of the worst on record for a combination of wet and cold conditions, and the usual worries attendant on lambing have been accentuated. It is well known that the first few hours in a lamb's life are the most critical, and it is at this time that any extra attention and care is best rewarded.

Dry cold is bad enough, but when severe cold is combined with wet conditions lambs are badly handicapped from the start and never get a real chance to get warm and dry. It is here that adequate shelter, which is sometimes

the one weakness in otherwise efficiently managed properties, can play such an important part.

The practice described and illustrated here is used on the property of Mr. H. Burgin, at Swannanoa, Canterbury, and is a good example of how worry and losses at lambing-time can, to a large extent, be prevented by the intelligent use of shelter. Mr. Burgin strongly advocates tree-planting, and during the time he has occupied this property has put in several thousands of various kinds.

Protection from Winds.

As will be seen from the two examples shown in the diagrams, these shelter-belts have been disposed to protect the

enclosures from all prevailing cold winds. Those illustrated are of *Pinus insignis*, used because of their quick growth, but periodically topped to keep them dense and from making too much upward growth.

These trees overhang a netting fence and give a good deal of overhead shelter as well, but to prevent bottom draughts under the trees Mr. Burgin has adopted the expedient of tying bundles of oat straw closely all the way along the fence on the outer side of the netting, thus making a virtually solid wall which is completely draught-proof. With the addition of straw scattered along the inside of the fence, a very snug and cosy lambing corner is provided.

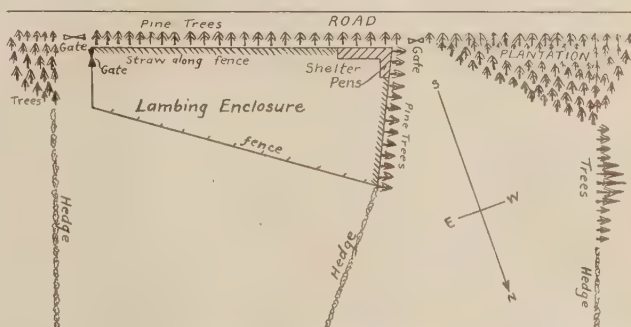
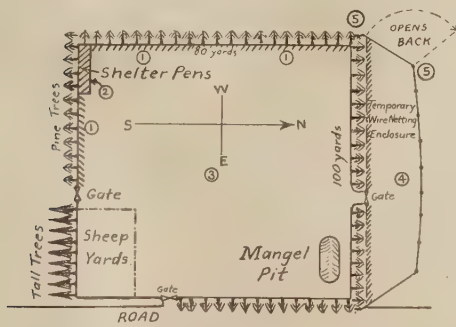


Fig. 1.—Left: A lambing enclosure almost totally enclosed by trees and completely protected from cold, prevailing winds. Fences to which bundles of straw are tied are marked with closely-placed diagonal lines; right: another well-sheltered enclosure.

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Fig. 2.—(a) A ewe with a newly-born lamb in a shelter-pen. (b) Another ewe with her newly-born lamb. (c) Bundles of straw tied along the fence in the temporary netting enclosure. (d) The type of shelter-pens used in each lambing enclosure.

Shelter-pens.

In addition to the shelter thus provided there are in the corner of each lambing enclosure a row of shelter-pens of the type illustrated in Figs. 2 (a) and 2 (d). These are quite simple, being knocked together from rough timber and a few hurdles. The roof, which is sloping, is simply a thick layer of straw supported on wire-netting. The dimensions for these pens found to give the best service are 4 ft. wide, 6 ft. deep, 5 ft. high at the front, and sloping to 3 ft. 6 in. high at the back. In Fig. 2 (b) is shown a ewe with a newly-born lamb in one of the pens.

Procedure Adopted.

The procedure adopted can best be followed by referring to Fig. 1. Ewes which are on the point of lambing are usually brought into the enclosure (3) each evening. By morning any lambs dropped will be found close up to the straw along the fence at (1). If the weather is at all rough the ewes and their lambs are then put into the shelter-pens at (2) for a few hours until the lambs have had a chance to dry and get a drink.

They are then transferred back to (3) to make room for others in the pens, and the ewes are fed out mangels. They are then put into the temporary wire-netting enclosure at (4) which, as it is

fairly well protected from the weather, can also be used as an emergency lambing pen. Finally, they go back out to the other paddocks at (5), among which are several containing fresh green feed, which is a useful insurance against ante-partum paralysis and a stimulant to milk-production after lambing.

Mr. Burgin considers that these shelters have saved him a great many lambs each season, not to mention the reduction in the amount of work and worry at lambing. The oat straw used will last two or three years, and is easily renewed.

Another farmer in the same district has used baled straw for building shelters and enclosures with considerable success, and there is no reason why rushes, manuka, or any other suitable material should not render good service.

Acknowledgments.

I wish to thank Mr. H. Burgin for permission to publish these details, and Mr. B. Grant, Chief Inspector of Stock, Christchurch, for drawing my attention to this very practical lay-out.

✦ ✦ ✦

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Top-dressing with Cobalt.

Experiments in Bush-sick Country.

C. R. TAYLOR, Fields Instructor, Whakatane.

AFTER it had been abundantly proved that cobalt, given to sheep at the rate of 1 mgm. per day, not only acted as a preventive for bush sickness, but also completely cured affected animals, it was decided to test the possibility of cobalt for indirect treatment of stock per medium of the pastures. Experiments at the Cawthron Institute had already shown that cobalt was readily taken up by the pasture.

With this end in view, two official experiments were carried out during 1937—one at Atiamuri, where the original limonite experiment was conducted seven years ago, and the other at Lichfield, in the Putaruru District. In both cases sheep were employed for the trial, as they are generally recognized to be much more susceptible to bush sickness than cattle. Moreover, their size lends them to experimental work of this nature because of the necessity for regular and accurate weighings.

The Lichfield experiment was commenced on the 10th May, 1937, and closed on 3rd January, 1938. A four-acre paddock was selected and subdivided into two equal areas of two acres each—one being top-dressed with superphosphate straight at the rate of 2 cwt. per acre, while the other received, in addition to a similar amount of super, 8 oz. of cobalt chloride per acre. Eight Romney breeding-ewes in lamb to Southdown rams were then put to graze on each area (four ewes per acre) after having been weighed and ear-tagged, and there they were left until the experiment terminated as it was not possible to arrange for a duplicate set of paddocks to allow of rotational grazing.

Selection of Sheep.

To make the trial as difficult as possible for the cobalt ewes and the results the more conclusive, the best sheep were selected for the control group, which averaged 8 lb. per ewe heavier than the cobalt ewes, and they were also depastured on the warmer and more sheltered paddock of the two. The combination of these factors undoubtedly favoured the control ewes, but in spite of this the final results left little room for doubt as to the efficacy of the practice of pasture top-dressing

The administration of cobalt to stock through the pastures by top-dressing with cobaltized superphosphate is an effective and economic means of combating bush sickness in those areas where top-dressing is applied annually as a routine practice. This is the conclusion arrived at by officers of the Department of Agriculture as the result of experiments in bush-sick country.

with cobalt. No other treatment was given the sheep, but during the winter both groups received a few swede turnips and each had access to plain rock salt. Actually very little was taken off either.

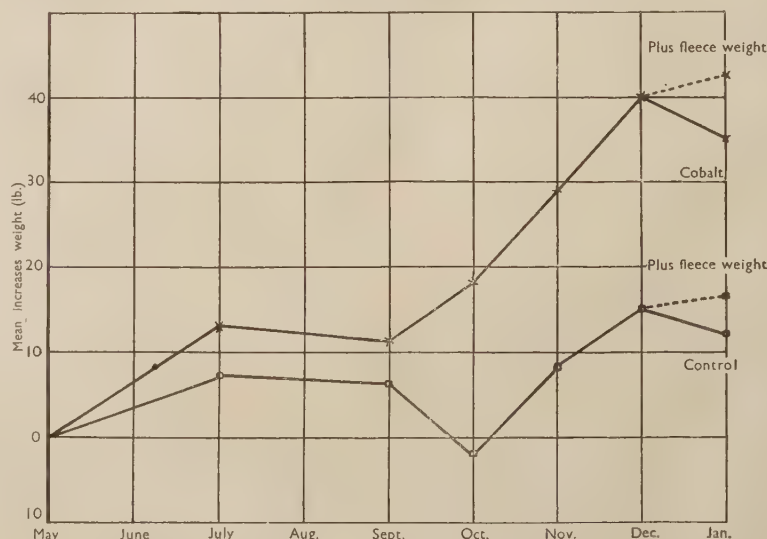
During the first four months the sheep in each group were weighed bi-monthly, but as the critical period (October to January) arrived monthly weighings were carried out to allow of a more efficient check of the progress of individual sheep to their respective treatments. The following table of average ewe weights in each group shows clearly the responsiveness of the cobalt group to the cobalt treatment.

Difference in Weights.

From the table of average weights it will be observed that, although the

Average Weights of Experimental Sheep.

Group.	10/5/37.	9/7/37.	7/9/37.	9/10/37.	7/11/37.	5/12/37.	3/1/38.
Control	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Cobalt	125	132	130	123	133	140	134.5
	117	130	128	135	146	157	152



Showing the mean increases, in pounds, of the two groups. The slump in weights between July and September is due to lambing and between December and January to shearing. The rise from October to December is due to seasonal change—i.e., greater abundance of feed, &c.

trial commenced with the sheep of the control group having an average individual advantage of 8 lb. over the sheep of the cobalt group, there was actually a difference of 25.5 lb. between the two groups in favour of the cobalt sheep at the end of the experiment. Added to this is the fact that the cobalt ewes clipped a fleece $\frac{3}{4}$ lb. heavier than the control group, the fleeces averaging 7 $\frac{1}{2}$ lb. and 7 lb. respectively. Further evidence of the superiority of the cobalt ewes is to be found in the lambing history of the two groups, which shows that, although the control lambs were born a full week earlier than the cobalt lambs, their respective live-weights when sent to the works were 78 lb. and 96 lb., or 36 lb and 42 lb. on the hooks. Both groups of lambs increased in weight fairly regularly until December, when the controls remained stationary while the cobalt lambs increased their average weight by 13 lb. Had it been possible to keep the experiment alive for another month there is very little doubt that the control group would have commenced to lose weight rapidly and thus a still more conclusive result would have been secured.

It is proposed to duplicate this experiment during the current year using Romney ewes in lamb to Romney rams, and to continue the trial with the female lambs into at least the second generation.

Atiamuri Experiment.

The Atiamuri experiment was somewhat similar to the one just described, except that fewer sheep were used in each group and an additional group was provided to test out the efficacy of limonite* with a high cobalt content as a pasture top-dressing instead of a lick as previously used. The quality of limonite used per acre was originally based on the cobalt equivalent of 8 oz. cobalt chloride, which was the amount applied to the cobalt paddock, but a later analysis of the cobalt content of the limonite showed that it contained only 110 p.p.m. instead of 200.

The paddock chosen for the trial was one of five acres and known from past experience to give rise to acute symptoms

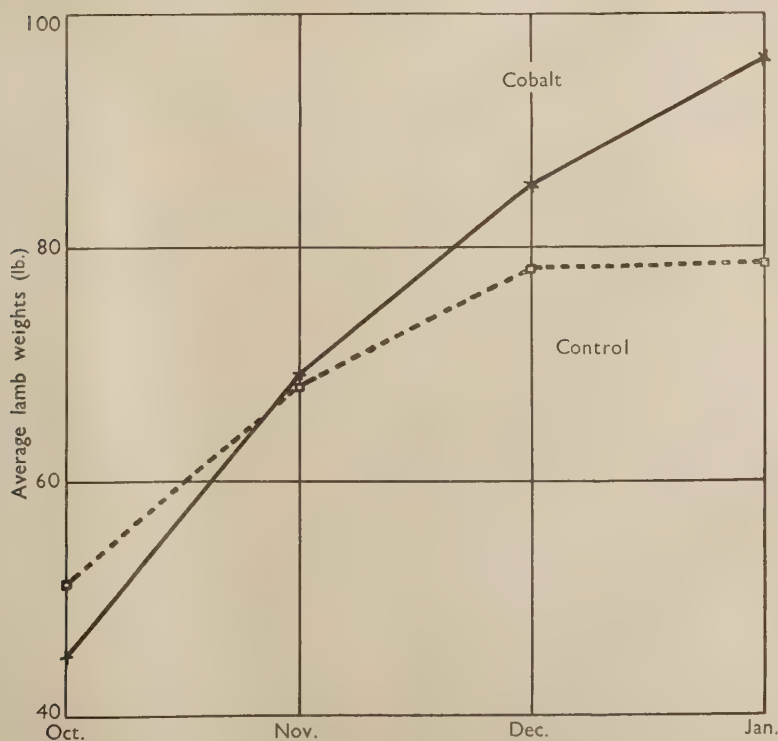
* The limonite used was kindly donated by the Okaihū Limonite Co.

of bush sickness in sheep grazed for any length of time. It was typical of many hundreds of acres of country on the same farm, the history of which is a most unenviable one from a sheep-farming point of view. Sheep-proof fences were erected, subdividing the area into three one-acre paddocks and one two-acre paddock, but one small area was not used. Each of the selected fields received an initial dressing of superphosphate at the rate of 2 cwt. per acre. Pasture consisted chiefly of brown-top, Chewings fescue, and cocksfoot with some white clover.

As in the Lichfield experiment, the sheep, which were a mixture of Romney and Romney-Southdown ewes (supposed not to be in lamb) of mixed ages, were so selected as to give all possible advantages to the control group. The limonite group was placed next, leaving the cobalt ewes well in the rear some 19 lb. below the average weight of the controls. Three sheep were grazed in each of the cobalt and limonite paddocks and five in the control paddock of two acres. It will be seen, therefore, that this arrangement in itself favoured the control group inasmuch as only two ewes and a half were carried to the acre instead of three as in the other two groups.

Marked Differences.

The experiment was commenced on the 3rd July, 1937, and is still being continued. Sheep in all groups made quite fair progress until October, which month, as stated previously, is usually considered the beginning of the critical period. From this time onwards the control ewes manifested obvious signs of bush sickness, and three out of the original five ewes had died by 1st January, 1938. In the other two groups very satisfactory progress has been made considering the great scarcity of feed due to a prolonged period of dry weather. At the time of writing the cobalt ewes had increased their average weight by 31.5 lb. and the limonite ewes by 14.5 lb. The control group (or rather the two survivors) gave an average weight that only differed from the original group weight by 0.3 lb. (increase), but no real significance can be attached to such a result as had the other ewes been alive the average weight would have been appreciably lower than the one indicated in the following table and graph.



Average lamb weights in Lichfield experiment.

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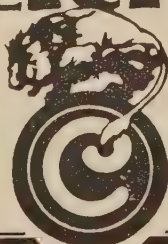
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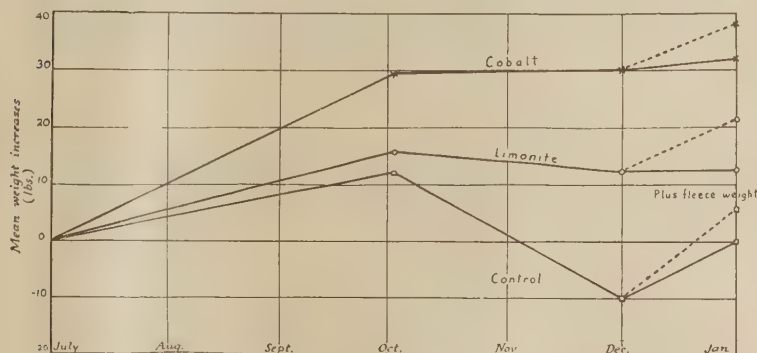
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Group.				3/7/37.	28/10/37.	21/12/37.	5/1/38.	Fleece-weights, 21/12/37.
				lb.	lb.	lb.	lb.	lb.
Control	..	..	..	89.4	101.6	79.5	89.7	6.0
Limonite	..	..	..	86.3	101.7	99.8	100.8	6.8
Cobalt	..	..	..	70.2	99.0	100.5	101.7	7.0



Mean weight increases in groups in Atiamuri experiment.

The drop shown in the weight of control group from October to December is due to rapid loss of condition, resulting from bush sickness in three ewes which died early in January. The apparent increase shown from December to January is

fictitious, as the figure given is merely the average weight of the two fairly healthy ewes that were left in the group, and no importance should therefore be attached to this apparent increase.

Condition of Lambs.

In the Atiamuri experiment no detailed records were taken of any lambs born, as at commencement of trial it was thought that all ewes were dry. Eventually, however, one was born in the cobalt group, three in limonite group, and two in control group. One in the control group died on 1st January, 1938, while the other one is poorly developed and generally subnormal. The lambs in both of the other groups are properly developed and well conditioned.

From the results of the experiments just described it can be concluded that cobalt has given a measure of relief from bush sickness in sheep never hitherto obtainable from any other pasture top-dressing used during the lengthy investigation into the cause of this complaint. That such relatively minute quantities of cobalt per acre are capable of producing such striking results is indeed remarkable, but when it is realized how very little per day is required by an animal to promote its normal development and maintain it in a thrifty condition it is not so very difficult to understand that, by raising the cobalt content of the pastures ever so slightly by way of top-dressing, the desired results have been obtained.

Cobalt Content of Both Pastures.

K. J. McNAUGHT, Chemistry Section, Department of Agriculture.

AFTER the experiments at Lichfield and at Atiamuri had been in progress long enough for obvious differences to develop in the health of the sheep in the two groups, samples of pasture were collected with a view to correlating health of the animals with the cobalt content of the pastures.

On the plot at Lichfield which received a top-dressing of $\frac{1}{2}$ lb. cobalt chloride per acre in May the cobalt content of the pasture was still more than 0.20 p.p.m. in October. The analysis of a number of North Island pastures* together with field observations on the efficacy of minute doses of cobalt salts has given strong evidence that 0.10 p.p.m., or even less, cobalt in pastures is sufficient to maintain sheep in health. Consequently, even five

months after the top-dressing with $\frac{1}{2}$ lb. cobalt chloride per acre, the cobalt content of the pasture was still more than double that required to maintain animals in health. Cobalt top-dressing experiments carried out in other localities have shown that the cobalt content of the pastures is highest in the first month following the application and falls off with time. The animals on this paddock, therefore, must have had access to a pasture very rich in cobalt for a period of at least five months. By December, however, the cobalt content of this pasture had dropped to 0.06 p.p.m., which is hardly sufficient (see footnote) but is still appreciably higher than the figure for the experimental control.

Previous Top-dressing.

When the experiment had been in progress some time it was discovered that the experimental control paddock had been used some six years ago for a limonite top-dressing trial. As the control ewes and lambs were doing considerably better than is usual on this country it

was decided to check up on the cobalt content of the pasture on the experimental control paddock. For this purpose samples of pasture were collected on the same day from the experimental control paddock and from a paddock nearby which received superphosphate regularly but no limonite top-dressing at any stage in its history. The pasture from the latter paddock was found to contain only 0.022 p.p.m. cobalt as compared with 0.040 p.p.m. for the experimental control. If this paddock had been selected instead of that actually used it is certain that the difference between the animals run on the control and experimental paddocks would have been even more striking.

At Atiamuri the pasture top-dressed with $\frac{1}{2}$ lb. cobalt chloride per acre in July contained in December, five months later, 0.12 p.p.m. cobalt. As in the Lichfield experiment, therefore, the sheep on this pasture received an ample supply of cobalt over a period of at least five months.

*For summary of the results see paper by C. S. M. Hopkirk and R. E. R. Grimmett, Vol. 36 (1), 21-24, January issue of this Journal, p. 21. In general, pastures healthy for sheep and cattle contain more than 0.07 p.p.m. cobalt, those healthy for cattle but unhealthy for sheep 0.04 to 0.07 p.p.m., while pastures unhealthy for both cattle and sheep contain less than 0.04 p.p.m. cobalt.

Results of Limonite.

It is interesting to observe that the limonite top-dressing has resulted in a significant increase in the cobalt content of the pasture. The excellent responses of animals run on this limonite top-dressed pasture may be in part due to the ingestion of some of the limonite itself (containing 110 p.p.m. cobalt) by the sheep, but the sample of pasture analysed was found to be quite free from adhering limonite particles, and consequently the increase in cobalt noted was due to an actual increase in the uptake and not to contamination. From the experience at Lichfield it is evident that limonite still continues to exert some slight influence for many years after its application. As the increase in the cobalt content of the pasture is relatively small when the amount of limonite used is considered, however, it is unlikely that top-dressing pastures with limonite will be an economically sound method for the treatment of bush sickness, though the efficacy of high-cobalt limonites when administered to animals in the form of limonite-salt licks can never be doubted.

When the experiments were instituted it was doubtful whether a single spring top-dressing at the very low rate of application of $\frac{1}{2}$ lb. per acre would be sufficient to carry sheep over the critical period of bush sickness between October and January. Although the cobalt content of the pastures at the later stages of the experiment tended to revert to normal low figures, the animals grazed on the cobalt-treated pastures remained in excellent condition and reared healthy lambs.

It is a well-known fact that in the past, when the only remedy for bush sickness was to change affected stock on to healthy pastures for a short period, a brief change of from three to four weeks was not only sufficient to restore an animal to health, but was also long enough to allow it to build up a reserve to carry it over a further period of six months or more. It has not yet been satisfactorily demonstrated that healthy animals build up any very appreciable reserve of cobalt in their bodies, though some organs, notably the liver, tend to accumulate small amounts of cobalt. The possibility of some unexpected reservoir of cobalt in healthy animals is being investigated. Whether or not cobalt is stored in the animal in large enough amount to constitute a "reserve," the fact remains that a healthy animal possesses a resistance to the onset of bush sickness. In the Lichfield and Atiamuri experiments the sheep which were grazed on the cobalt-treated pastures should have developed such a resistance. It is not surprising, therefore, that the top-dressing experiments have been so outstandingly successful in spite of an evident drop in the cobalt content of the pastures almost to normal levels by late summer.



Cobalt ewes in Arohena experiment.



Control ewes in Arohena experiment.

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Top-dressing with Cobalt.

Arohena Experiment.

G. B. MELROSE, Inspector of Stock, Te Awamutu.

COBALT-FEEDING experiments were carried out on the farm of Mr. A. R. Weal, at Arohena, during the latter part of 1936 and early part of 1937, a full report of which was published in this *Journal*.*

This experiment showed that cobalt is efficacious in preventing bush sickness in the Arohena district if given as a drench at regular intervals of once or twice a week, and disposed of the theory held by some farmers that major doses given at long intervals are equally effective for maintaining ewes and lambs in good condition.

It should also be pointed out that, although drenching with cobalt has been tried experimentally, it is not always a practical method of control of bush sickness, as the labour involved is considerable, especially when large numbers of sheep have to be dosed regularly (at least once a week).

With the knowledge gained from the above experiment it was obvious that further field-work would be necessary if a practical means of giving the cobalt to stock was to be found. With this end in view Dr. C. S. M. Hopkirk and Mr. D. Marshall conferred with Mr. A. R. Weal, of Arohena, with a view to conducting top-dressing of the pastures with a cobaltized superphosphate fertilizer.

Nature of Experiment.

Mr. Weal kindly agreed to place two paddocks and sixty-six ewes and lambs at the disposal of the Department for this work. The paddock to be top-dressed with cobaltized superphosphate was subdivided to allow the experimental ewes a change. It was decided to top-dress the paddock of six acres with a mixture of 18 cwt. of superphosphate and 14 lb. of cobalt nitrate, allowing 3 cwt. per acre; this would mean 2½ lb. of cobalt nitrate per acre. The mixture was sown between 28th August and 2nd September, 1937.

Mr. W. T. Collins, Mr. D. Marshall, and the writer selected twenty-five ewes and twenty-five lambs (Group 1) for the cobalt-super paddock, and eight ewes and eight lambs (Group 2) for the control paddock (which had not been top-dressed during the 1937 season). The sheep were ear-tagged, weighed, and raddled on



Cobalt lambs in Arohena experiment.



Control lambs in Arohena experiment.

the 26th August, 1937. No drenches for parasites were administered, nor licks made available to either group during the period of the experiment.

All sheep were weighed once a month and state of health noted. Pasture samples from the experimental and

control paddocks were taken at intervals for analysis for cobalt content.

The following table gives the average weight-increases in each group, in relation to the original weight at the inception of the experiment:—

Average Weight-increases (Pounds) from Inception of Experiment.

Date.	Experimental Group (No. 1).		Control Group (No. 2).	
	Ewes.	Lambs.	Ewes.	Lambs.
4th October, 1937.. ..	7·4	22·7	5·7	30·7
2nd November, 1937	20·0	41·0	18·3	49·3
13th December, 1937	30·6	62·5	20·6	56·3
11th January, 1938	26·1	72·5	31·4	60·7
22nd February, 1938	29·3	72·1	21·6	55·2
10th April, 1938	27·0	78·5	16·7	59·0

Progress of Sheep.

The No. 1 group of ewes did well, showing steady progress to the last two weighings, when apparently the cobalt content of the pasture, though now partially depleted, was still sufficient to maintain the ewes in good health and condition without showing any marked

increase in the weight. At the last weighing the ewes were in excellent health and condition.

The experimental lambs made good progress throughout the experiment, produced a good clip of wool, and at last weighing were in excellent health and condition.

* Hopkirk, C. S. M., *N.Z. J. Agric.*, 1937, 54 (6), p. 344.

The second or control group did only fairly, as was to be expected in this locality, having no access to limonite licks. One ewe died after the second weighing, while one lamb died, from an unaccountable cause, after the first weighing. Two lambs died after the fifth weighing, the cause of the deaths unknown, while on the other hand one lamb (No. 108) appears to have done exceptionally well. At the last weighing the average increase

in the weight of the control lambs was 59 lb., as compared with 78.5 lb. in the No. 1 group. However, the average figure for the surviving control lambs does not really represent a true average for the group, as, if the other lambs had been alive, the average weight would then have been still lower. The wool clip from the control lambs averaged $1\frac{1}{4}$ lb. less than that from the experimental lambs and was of poorer quality.

Acknowledgments.

The thanks of the Department are due to Mr. A. R. Weal, who made the experiment possible by placing a portion of his farm at the disposal of the Department, by providing the requisite number of ewes and lambs and assisting with the monthly weighing. Thanks are also due to Dr. E. Marsden, who kindly made available the cobalt nitrate used in this experiment.

Cobalt Content of the Arohena Pastures.

K. J. McNAUGHT, Chemistry Section, Department of Agriculture.

THE Arohena experiment differed from those at Putaruru and at Atiamuri mainly in that the cobalt used was in the form of the nitrate instead of the chloride and a larger amount of cobalt salt per acre was applied. The use of the nitrate instead of the chloride when incorporated in a large bulk of superphosphate should not, however, affect the result in any way, but it must be noted that the amount of cobalt element in the nitrate is only 20.3 per cent., as compared with 24.8 per cent. in the chloride. Consequently the amount of $2\frac{1}{4}$ lb. of cobalt nitrate used per acre

is equivalent to only 1.9 lb. of cobalt chloride in regard to its content of elementary cobalt.

This rate of application is still nearly four times that employed in the Putaruru and Atiamuri experiments, and, as expected, the uptake of cobalt by the pastures was much greater. The cobalt content a month after the application was more than 2 p.p.m., or about twenty times the concentration required in the diet of sheep, while even six months later there was still more than 0.1 p.p.m. cobalt in the pasture. In marked contrast the control pasture remained low in cobalt throughout the experiment.

Summary.

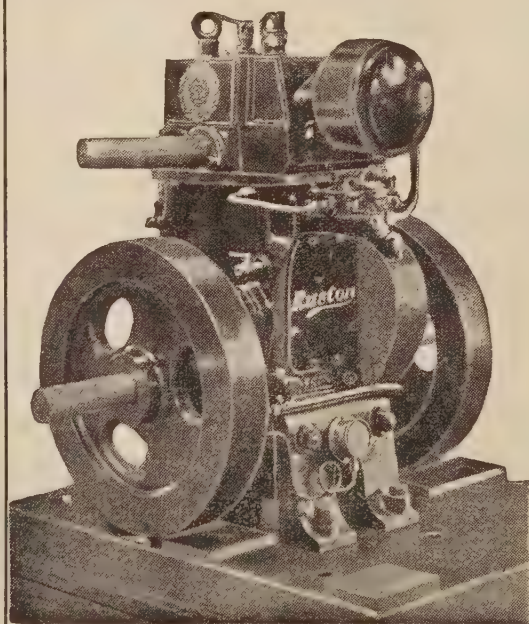
(1) A six-acre paddock at Arohena was top-dressed near the beginning of September, 1937, with 18 cwt. of superphosphate containing 14 lb. of cobalt nitrate.

(2) The treatment resulted in a greatly increased cobalt content of the pastures, which increase had persisted up till the time of last sampling in May.

The administration of cobalt to stock through the pastures, by top-dressing with cobaltized superphosphate, is an effective and economic means of combating bush sickness in those areas where top-dressing is applied annually as a routine practice.

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Winton Grazing Trial.

Relative Merits of Hawke's Bay and Southland Rye-grass.

J. M. SMITH, Fields Superintendent, Dunedin.

IT is contended by many farmers in Southland that while, from an observational point of view, the local rye-grasses do not look as well as those from the North Island at certain seasons of the year, the best Southland strains will produce as many, if not more, pounds of fat-lamb per acre. It is to obtain information on this point that the trial was undertaken, and details of the lay-out and the first year's operations were published in the *Journal* last January (Vol. 56, No. 1).

Eight Comparative Paddocks.

The trial comprises eight comparative paddocks, each $2\frac{1}{2}$ acres in area, and these are set off in pairs, one paddock of each pair being sown with a blend of the ten best Southland rye-grasses available, and the other with a blend of ten lines of Government-certified mother-seed rye-grass from Hawke's Bay. A line of 120 two-tooth ewes was divided into two separate flocks of 60, and one flock has been confined entirely to the Southland paddocks and the other to the Hawke's Bay paddocks.

The whole area was sown down in October, 1936, and was limed prior to sowing with carbonate of lime at the rate of 1 ton per acre. Superphosphate at the rate of $2\frac{1}{2}$ cwt. per acre was sown

Although no conclusions should yet be drawn as the trial is to be conducted for another few seasons, much useful information has been obtained from the Winton grazing trial. The object is to determine the relative merits of the best Southland type perennial rye-grass as compared with mother-seed type perennial rye-grass from Hawke's Bay for fat-lamb production under Southland conditions. The basis of the trial is to use production per acre as the factor of measurements.

with the seed. In the autumn of 1937 all paddocks were top-dressed with superphosphate at the rate of 3 cwt. per acre, while a similar dressing was carried out early in March this year.

The Pasture Sward.

Twice a year an analysis is made of the pasture sward to determine the density of the pasture and the proportion in which the various species are present. This is done by the point method of analysis (*Journal of Agriculture*, May, 1933, Vol. 46, No. 5). The analysis this autumn was not carried out until early in June, so that it really represents the condition of the sward in the early winter. Details of analyses made to date are as follow:—

These figures, which are not percentages but comparative points, indicate that, in a general way, little actual change has taken place in the sward during the past season. Clovers in both cases have strengthened up a little, but seasonal conditions have not been favourable to vigorous clover establishment. It must also be remembered that an uncertified clover was sown.

An interesting feature revealed by this analysis, but one on which it would be yet too dangerous to dogmatize, is that the Hawke's Bay rye-grass appears to maintain its standard throughout the year, whereas the Southland rye-grass is practically as vigorous in the spring as the Hawke's Bay, but falls away in the autumn and early winter.

Carrying Capacity.

As explained in the previous article, only the results from three paddocks in each case are recorded, as the fourth paddock in each instance is reserved for a holding paddock in order that, when carrying is temporarily reduced, the ewes taken out are held on similar pasture and do not go off on to a common pasture. This is necessary in order to ensure that no outside factor of pasture can possibly affect these ewes pending their return to the trial proper.

Details of the carrying-capacity of the various paddocks since the commencement of the trial giving the totals up to June, 1937, and the monthly details from July, 1937, to June, 1938 (inclusive), are

	May, 1937.		October, 1937.		June, 1938.	
	Hawke's Bay.	Southland.	Hawke's Bay.	Southland.	Hawke's Bay.	Southland.
Bare ground	32.0	49.0	30.6	29.8	36.3	38.6
Perennial rye-grass ..	71.0	55.0	79.5	76.1	65.3	55.6
White clover	5.5	4.1	11.0	10.5	8.3	10.0

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as follow (the figures are grazing-days per acre, each figure representing one sheep for one day for each acre) :—

The averages, when divided by 365 (being the number of days in the year), gives the carrying-capacity per acre in

	Hawke's Bay Paddocks.			Southland Paddocks.		
	1.	2.	3.	1.	2.	3.
Up to June, 1937 ..	813·6	813·6	922·61	814·4	814·4	922·61
Averages of three paddocks	849·93			850·47		
1937.						
July ..	180·0	180·0	173·07	180·0	180·0	173·07
August ..	..	..	..	..	..	..
September ..	101·0	101·2	63·47	66·0	66·0	63·47
October ..	486·2	490·2	253·07	226·3	284·4	223·55
November ..	327·8	333·0	265·38	228·0	257·5	178·84
December ..	362·2	387·0	265·76	310·6	272·8	231·92
1938.						
January ..	297·8	296·2	216·53	255·2	259·6	242·88
February ..	192·5	192·8	152·06	185·3	185·8	154·63
March ..	288·0	288·0	161·56	288·0	288·0	161·56
April ..	195·2	147·2	117·71	195·2	147·2	117·71
May ..	166·8	166·8	184·26	166·8	166·8	184·26
June ..	180·0	180·0	173·08	180·0	180·0	173·08
Totals ..	2,777·5	2,762·4	2,025·95	2,281·4	2,288·1	1,904·97
Averages of three paddocks	2,521·95			2,158·16		

terms which are more readily understood by farmers. These are: 6·91 sheep per acre for the Hawke's Bay areas, and 5·91 sheep per acre for the Southland areas. Included in this figure are the lambs which, for the purpose of calculating carrying-capacity, are reckoned at equal to one-quarter sheep up to the age of two months and one-half sheep from two to four months. As the lambs were dropped late in September pastures were credited with one-quarter sheep per acre during October and November for lambs, and with one-half sheep per acre for the rest of the period until drafting.

Non-grazing Periods.

It will be noticed that there was no grazing during August and the early part of September. During this period the whole flock was put on to swedes with a run-off on to their respective holding-paddocks. It was intended to feed out the turnip crop on to the respective areas, but because of the partial failure of the turnip crop and the exceptionally wet winter it was deemed inadvisable to do this. During this winter, however, the flocks are having turnips fed to them on their paddocks, and during June 6½ tons

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of swedes were fed to each flock. This means that during June the turnip ration per ewe daily has been $7\frac{1}{2}$ lb.

No hay has been fed, as it is felt that with the hay available, which contains a fair proportion of seedy rye-grass, feeding would result in a rye-grass contamination of the pasture. Arrangements are being made to save clover hay this coming season, as such hay could be fed to the ewes without the risk of the introduction of seed which would tend to change the rye-grass composition of the pasture. Now that the pasture growth is practically dormant (early July) oaten chaff is being fed to the ewes in order to balance up the turnip ration.

Seasonal Growth.

With regard to the seasonal growth on the two areas under trial, it is of interest to record that the flush growth on the Hawke's Bay area took place in October, whereas a similar period of flush growth on the Southland areas was not experienced until December. This is borne out by the grazing figures in the table on page 214. It will be noticed that the average sheep-days for the three Hawke's Bay paddocks in October was 409.82, as compared with 244.75 sheep-days for the three Southland paddocks, whereas the figures for December were 338.32 and 271.77 respectively.

This proved to be quite an important factor of management in that, with the flush growth on the Hawke's Bay area coming in October, it was possible to control the growth by heavier stocking without in any way interfering with the progress of the lambs, but in December, when the flush growth of the Southland rye-grass was experienced, heavy stocking to the point of control of growth would have resulted in the lambs receiving a set back.



Fig. 1.—A general view of the Oreti Plain, Southland, which is one of the main fat-lamb areas, and on which the Winton Farm is situated.



Fig. 2.—A view of one of the Hawke's Bay areas on 19th October, showing the ewes with lambs.



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Again, the tendency with a flush growth as late as December, especially in a dry, early summer, was for this growth to run rapidly to seed-head, a factor which was not experienced in October. In order to enable the Southland rye-grass to continue to produce leafy herbage the mower was run over the Southland paddocks in December, but the material so mown was very light and was scarcely discernible on the paddocks.

Lambing Percentages and Weights.

As the flocks were composed of maiden ewes high lambing percentages were not expected, and there were fifty lambs dropped in the Hawke's Bay flock, equivalent to 83.3 per cent., and fifty-six, or 93.3 per cent., for the Southland flock. One lamb died in the Southland flock, and two from the Hawke's Bay flock were drowned in the troughs.

Prior to this stage it was necessary to reduce the flock on the Southland area to forty-five ewes, while the whole sixty ewes were still being carried on the Hawke's Bay area. To balance up the lambs, forty-three lambs were left with forty-five ewes on the Southland paddocks (representing a lambing of 95.5 per cent.), while there were forty-eight lambs with sixty ewes on the Hawke's Bay paddocks (representing a lambing of 80 per cent.). This was definitely in favour of the Southland area.

On 21st December it was found necessary to remove eight ewes from the Hawke's Bay flocks, and dry ewes were removed. This was considered to be quite fair, as these pastures had produced all these lambs, and it would have been unfair to this area to have removed any ewes with lambs. This was within nine days of the first drafting. On 30th December the lamb-buyer drafted the first lot of lambs, and this draft resulted as follows:—

Hawke's Bay, 28 from 48 (58.3 per cent.). Average weight, 31.64 lb.

Southland, 13 from 43 (30.2 per cent.). Average weight, 29.92 lb.

The second draft was picked on 2nd February, and resulted as follows:—

Hawke's Bay, 10 from 20 (50 per cent.). Average weight, 30.10 lb.

Southland, 15 from 30 (50 per cent.). Average weight, 31.26 lb.

Details of these two drafts and revenue received are as follow:—

	Number.	Percentage off Mothers.	Total Weight.	Average Weight.	Amount.
		Per Cent.	lb.	lb.	£ s. d.
Hawke's Bay ..	38	79.1	1,187	31.23	38 18 0
Southland ..	28	65.1	858	30.63	28 2 3

Wool Weights and Valuations.

At shearing-time the wool from the two flocks was kept separate, and weights were taken and valuations made. The total wool-weight from the Hawke's Bay flock was 557 lb., or 9.28 lb. per head, and that from the Southland flock 537 lb., or 8.95 lb. per head. If we use this wool figure per ewe in conjunction with the carrying-capacity figures already quoted (Hawke's Bay 6.91, and Southland 5.91) we find that the Hawke's Bay areas

produced 64.12 lb. of wool per acre and the Southland areas 52.89 lb. per acre.

Wool valuations of the two clips were kindly made by the Southland Farmers' Co-operative and a very detailed list of values determined. The average value for the wool from the Hawke's Bay flock was 8.9d. per pound, and that from the Southland flock 8.92d. per pound.

Summary of Production Figures.

The following is a summary of production figures for the first season:—

	Hawke's Bay Areas.	Southland Areas.
Carrying-capacity	6.91 Sheep per Acre.	5.91 Sheep per Acre.
Details of two drafts of fat lambs—		
Total number	38	28
Percentage off mothers	79.1 per cent.	65.1 per cent.
Total weight	1,187 lb.	858 lb.
Average weight	31.23 lb.	30.63 lb.
Revenue from lambs	£38 18s.	£28 2s. 3d.
Wool weights, &c.—		
Per head	9.28 lb.	8.95 lb.
Per acre	64.12 lb.	52.89 lb.
Valuations	8.9d.	8.92d.
Revenue from wool	£2 7s. 6½d.	£1 19s. 3½d.
Total revenue per acre—		
Lambs	£5 2s. 4½d.	£3 13s. 11½d.
Wool	£2 7s. 6½d.	£1 19s. 3½d.
Total	£7 9s. 11d.	£5 13s. 3½d.

To this should be added the value of the lambs produced but rejected at drafting. Of these, there were ten from the Hawke's Bay flock and fifteen from the Southland flock. Basing the value of these at 15s. per head, the additional revenue per acre returned to the respective areas would be 19s. 8½d. to the Hawke's Bay area, bringing the total to £8 9s. 7½d., and £1 9s. 7½d. to the Southland area, bringing this total to £7 2s. 10½d.

Condition of the Flocks in the Late Autumn.

A report on the condition of the two flocks was obtained early in May, when Mr. A. Taylor, of the Southland Frozen Meat Co., made a detailed inspection of the animals. He reported that there was little to separate the two lines regarding conditions, each lot having ten ewes below the average, but the Southland flock had three very thin ewes, whereas the Hawke's Bay flock had only two.

As regards size and growth, Mr. Taylor stated that neither lot was as well grown as one would expect four-tooth ewes on good country to be, but the Southland lot were better grown than the Hawke's Bay lot. With regard to wool, the Southland lot had a better bloom on them, whereas the Hawke's Bay lot were dull and white. On a scale of points Mr. Taylor pointed the flocks up as follows:—

	Hawke's Bay.	Southland.
Condition	10	9½
Growth	8½	10
Wool	9½	10
Total	28	29½

Another Four Seasons.

This trial is to be conducted for another four seasons, so that no conclusions should yet be drawn. Each season a full report on the progress of the trial to date will be published in the *Journal*, and at the conclusion of the trial the whole position will be reviewed and the results summed up.

The Committee connected with the trial wishes to express its appreciation to Mr. A. Stuart, Instructor in Agriculture, Invercargill, who is supervising the whole trial, to Mr. Kemp, the farm-manager; to Mr. A. Taylor, the Southland Farmers' Co-operative; and the fat-lamb buyers for their assistance.



Importance of Good Shed-management.

P. S. SYMF. Instructor in Agriculture, Warkworth.

EVER since the New Zealand farmer first began to specialize in milk-production the importance of a high herd average in relation to profitable farming has been increasingly realized. Much has been written of the value of adequate feeding at all periods throughout the year, and the gospels of rotational grazing, conservation of grass fodder, supplementary crops, &c., have all been well expounded to a ready and receptive audience. The field of breeding, too, has by no means been neglected, so that butterfat-backing has become almost a fetish, and has at times even tended to obscure the value of constitution—a point of some significance when considering the very high replacement percentages which prove so heavy a burden to many of our herds to-day.

While the importance of feeding and breeding in relation to yield are of extreme importance, the part played by management in the shed should not be overlooked. The farm may be the factory;

but the shed is the heart of the farm. It is there that the major portion of the farmers' work is performed, and it is there that the harvest is gathered.

A well-designed and properly equipped shed may be regarded rather as an essential than as a luxury. Any improvements which tend to expedite the work, to promote cleanliness, or to reduce drudgery are likely to return dividends in increased production.

The best of sheds and the most lavish of equipment, however, are of little value without good shed-management. The following remarks, although platitudes to many, may still be worthy of mention.

Need for Gentle Handling.

Most cows, although apparently of a placid temperament, are in reality highly nervous and easily excited. In this condition the animal is unable to give her maximum yield. Rough handling, quick droving, and loud and violent abuse are never conducive to high production.

Other things being equal, the quick milker will get more milk than the slow milker, and the thorough one more than the careless one. Under natural conditions, feed is often scarce, and although a cow will rob her own body to nourish her calf, she tends to economize her body resources and to regulate the supply according to the demand. Where machine milking is practised, too high a vacuum should be avoided, and the machines should not be left on after the milk flow has ceased. A glass milk interceptor can be easily fitted to show at once when a cow is being over-milked,

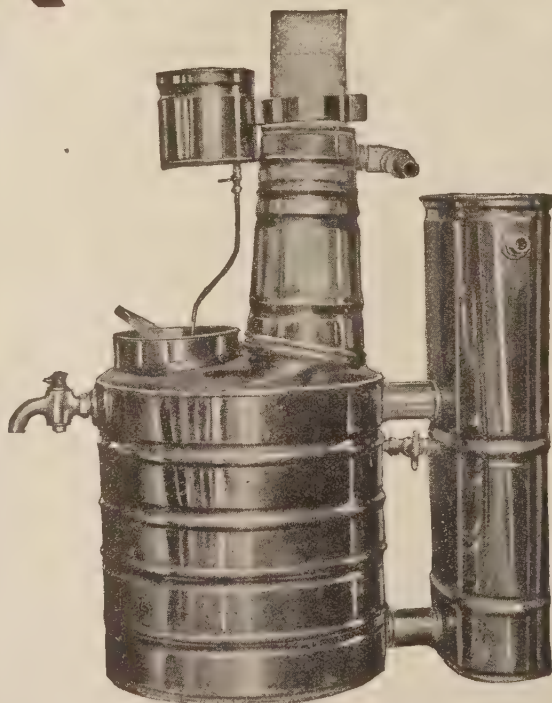


Fig. 1.—Cows should be driven in leisurely for milking.



Fig. 2.—The milking-bail as used in the No. 1 shed at the Ruakura Farm. Note the box for feeding concentrates and the milk interceptor.

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Attention to Health of Cows.

If, for any reason, a cow is down in her yield or appears to be off colour, she should receive immediate attention. The trouble may be due to slight indigestion, chill, or a variety of causes, and taken in the initial stages may be easily cured by a simple dose of salts. If, however, the trouble is allowed to develop, serious illness may result, with a consequent heavy fall in yield. It is well understood by most farmers that, particularly at certain stages of the lactation period, any fall in daily yield may be hard to regain.

During certain periods of the year the staple ration may be too loosening or too binding. In this connection the correcting action of appropriate foods, such as hay, bran, linseed, &c., should be kept in mind.

Mastitis still takes heavy toll of many herds. While no cure is yet available, good shed-management will afford some measure of control and will greatly minimize losses arising from this cause. (See the March issue of the *Journal*.) It should be realized that many stock diseases are highly infectious and are readily spread during milking. For this reason, aborting cows or animals suffering from mastitis should, if possible, be segregated and milked last.

Drying off Cows.

The very intensity of the effort to obtain high yields frequently defeats itself, and the present gain of a few pounds of butterfat may be obtained at the expense of the following season's production. To produce of her best a cow must calve in good condition, and it is unfortunate that it is usually the high producer which is most likely to suffer in this respect.

To do herself justice the good milker requires at least six or eight weeks for rest and recuperation before commencing the arduous work of another season. Where mastitis is prevalent, particular care should be exercised in the drying off, as carelessness at this period frequently results in udder trouble after calving.

Value of Concentrate Feeding.

The opinion has frequently been expressed that more extensive use could be made of concentrates for the high producers. This is particularly important when an adequate quantity of good-quality grass is not available and the animals are milking heavily. The cost need not be high, and even a small quantity of concentrates fed during milking will materially assist in maintaining the milk yield through a critical period, and will, at the same time, help

to keep the animals in a fit condition. It is not sufficiently realized that heavy production imposes a correspondingly heavy strain on constitution.

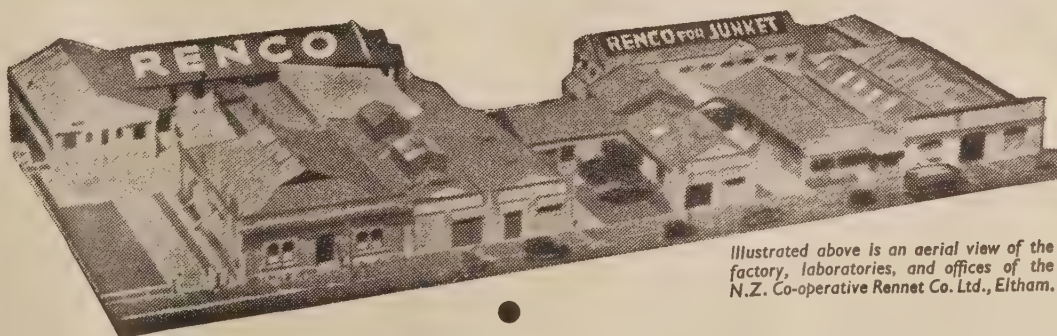
Good condition is the best defence against disease, while lowered vitality is invariably associated with a high incidence of disease, low average yields, and high replacement costs. Prevention is better than cure, and the provisions of concentrates to selected animals, particularly the "deserving cases," will, in the long-run, repay its cost in healthier stock and higher yields. It should be remembered that, while the low producer readily puts on fat, this seldom occurs with the high producer actually in milk, and it is the high producer which most deserves and can best repay this preferential treatment.

Importance of Cleanliness.

From the point of view of disease control as well as in the interests of a better-quality product, close attention should be paid to ensuring that the shed, machines, and utensils are kept as clean as possible. It is admitted that this may entail some extra work, but it is certain that any additional cost or labour involved will be amply justified by more pleasant working-conditions, healthier stock, and better financial returns.

✱ ✱ ✱

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Certificate-of-record Testing.

Dairy Division.

THE appended list contains particulars of performance for all cows which have received certificates of record during the first eight months of the present calendar year. This is a period when comparatively few certificates are issued, but, although the number of certificates is small, some very fine yields have been recorded, particularly by Friesians.

The outstanding performance is that of Oakview Keyes Trojan, the junior two-year-old Friesian heifer bred by the Oakview Stud Farm, Patumahoe, and owned and tested by Mr. A. W. Montgomerie, of Mangere, Auckland. This heifer, with a production of 22,146·8 lb. milk containing 836·98 lb. butterfat, in 365 days, displaces the previous Friesian class-leader in the junior two-year-old division, a distinction held for seventeen years by Mr. T. H. Richards' Monavale Queen Bess with a production of 740·50 lb. butterfat to her credit. Keyes Trojan thus raises by 96 lb. a record which has stood for a long period, and it will take a good cow indeed to better her production figures.

Oakview Keyes Trojan has eclipsed both the senior two-year-old and junior three-year-old Friesian class leadership figures, and when it is remembered that the heifer commenced her testing period at the early age of 2 years 131 days this record is all the more meritorious.

Outstanding Performances.

Outstanding performances are not uncommon in Mr. Montgomerie's herd. In the April issue of the *Journal* Mr. Montgomerie was recorded as having the highest first-class C.O.R. Friesian for 1937, Glendale Dutch Ashburn 2nd, with 842·01 lb. butterfat to her credit, and another of his cows, Manukau Zozo Sylvia, qualified in February of this year with a production of 905·80 lb. at the age of 7 years 56 days.

The production of 836·98 lb. butterfat is a splendid feat for a junior two-year-old, and credit is due to the owner for the care and attention which Oakview Keyes Trojan must have received during the time she was under test to enable her to complete such an outstanding record. Congratulations are extended to Mr. Montgomerie.

In the August *Journal* reference was made to the record of the Jersey cow Ashvale Dreaming Stella, bred and tested by Messrs. J. and G. W. Dobson, of Lepperton, Taranaki. Stella calved subsequent to test on the 19th August, and thereby fully qualifies for her certificate. Her leadership of the senior two-year-old Jerseys in both the 365-day and 305-day divisions of the certificate-of-record test is thus confirmed.

The list of cows which have received certificates-of-record during the first eight months of 1938 is as follows:—

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season.		
				Days.	Milk.	Butter-fat.

YEARLY DIVISION.

Jerseys.

Junior Two-year-old.		Yrs.	dys	lb.	lb.	lb.
Erinview Meg ..	J. Murray, Woodville	2	56	281·1	365	10,964·6
Premier Pelican ..	W. Dunn and Sons, Waihou	1	310	273·5	365	6,414·2
Windermere Fairy Lassie	V. McD. Hitchings, Otorohanga	2	27	278·2	365	7,050·3
Glamorgan Soumise Viola	S. G. Morgan, Mangatoki	2	17	277·2	187	6,148·2

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season.		
				Days.	Milk.	Butter-fat.

YEARLY DIVISION—continued.

Jerseys—continued.

Senior Two-year-old.		Yrs.	dys	lb.	lb.	lb.	
Coniston Coy Rose ..	R. Waterhouse, Takanini	2	166	292·1	365	8,170·8	565·78
Jersey Meadows Brunette	J. A. Ranger, Putaruru	2	325	308·0	305	8,592·3	468·54
Silverstream Begum	G. B. Hull, Silverstream	2	126	288·1	365	7,350·7	408·86
Three-year-old.							
Beaulieu Sunmaid ..	Dr. G. Walker, Maunu	3	30	315·0	365	11,711·3	715·61
Hampton White Socks	A. M. Bell, Otorohanga	3	364	348·4	365	11,301·8	705·33
Heatherlea Golden Patch	H. J. Lancaster, Levin	3	173	329·3	365	9,805·1	583·25
St. Owens Twilight ..	J. Johnson, Sefton	3	206	332·6	365	9,515·4	551·89
Waveney Violet ..	Mrs. E. Aldis, Feilding	3	29	314·9	365	7,751·8	513·15
Brookdell Saxon Girl	N. M. Colson, Waitoa	3	311	343·1	327	8,142·2	472·39
Tyrone Merle ..	R. J. Johnston, Runciman	3	184	330·4	365	8,407·6	438·97
Ebors Therese ..	R. J. Wilson, Putaruru	3	349	346·9	150	6,558·3	367·58
Four-year-old.							
Tararua Silverlocks ..	W. H. Jakins, Christchurch	4	304	378·9	299	12,429·6	606·37
Nga Tawa Azalea ..	J. Browning, Tariki	4	298	341·8	336	9,339·5	604·55
Ashleys Duchess ..	W. T. Dazeley, Pukekohe	4	311	379·6	316	8,296·7	483·07
Royton Fairy Poppy	H. Moreland, Newstead	4	187	367·2	365	8,269·4	445·77
Ascalon Floss ..	C. L. Harkness, Waiuku	4	36	352·1	365	7,448·8	424·98
Holly Oak Chloe ..	D. Hale, New Plymouth	4	100	358·5	333	6,864·0	404·29
Mature.							
Royton Flag's Lass ..	H. Moreland, Newstead	6	61	385·0	364	12,839·1	651·30
Wellfield Redwing ..	R. Fleming, Waimana	5	72	385·0	365	9,855·6	633·72
Helston Priscilla ..	J. T. Hill, Bunnythorpe	6	72	385·0	365	11,403·7	620·25
Royton Fashion ..	H. Moreland, Newstead	8	341	385·0	355	12,199·3	594·71
Windermere All Gold	V. McD. Hitchings, Otorohanga	7	153	385·0	365	9,758·5	530·55

Friesians.

<i>Junior Two-year-old.</i> Oakview Keyes Trojan	A. W. Montgomerie, Mangere	2 131	288·6	365	22,146·8	836·98
<i>Senior Two-year-old.</i> Hobson Val Chloe ..	Hobson Farm, Wharepapa	2 334	308·9	365	13,941·6	605·01
<i>Junior Three-year-old.</i> Totara V.S. Amber 2nd	Piri Land Company, Auckland	3 159	327·9	270	10,389·4	460·70
<i>Junior Four-year-old.</i> Gleniffer Echo Flora Beets	R. Dick, Weston	4 131	361·6	175	10,533·1	394·68
<i>Mature.</i> Manukau Zozo Sylvia	A. W. Montgomerie, Mangere	7 56	385·0	365	24,086·2	905·80
Willowburn Astor ..	R. J. Potter,	7 14	385·0	365	22,721·0	744·11

Milking Shorthorns.

Junior Three-year-old.	G. D. Hall	3	143	326·3	365	10,401·6	467·31
Pinedale All Gold ..	and Son, Otorohanga						
Junior Four-year-old.							
Sefton Ruby ..	J. Peach, Sefton R.M.D.	4	118	360·3	365	13,329·2	610·68
Mature.							
Allandale Lady Clare	R. S. Allan and Son, Hatuma	6	132	385·0	365	16,326·9	686·29

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season.		
				Days.	Milk.	Butter-fat.

SECOND-CLASS CERTIFICATES.

Jerseys.

		Yrs. dys.	lb.	lb.	lb.
<i>Junior Two-year-old.</i> Helston Prudence Dean	J. T. Hill, Bunnythorpe	2 46	280·1	365	8,696·6
Helston La Frances Jewel	J. T. Hill, Bunnythorpe	2 52	280·7	365	8,352·5
<i>Senior Two-year-old.</i> Coniston Bright Goldie	R. Waterhouse, Takanini	2 265	302·0	365	9,493·6
<i>Four-year-old.</i> Stonycroft Marguerite	S. Unwin, Winchester	4 319	380·4	365	8,865·0

Friesians.

		Yrs. dys.	lb.	lb.	lb.
<i>Two-year-old.</i> Longbeach Transvaal Star 23rd	J. H. Grigg, Longbeach	2 177	293·2	365	10,273·9
<i>Mature.</i> Ohio Domino Sensation	C. H. Potter, Pukerau	10 92	385·0	365	23,309·0

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season.		
				Days.	Milk.	Butter-fat.

305-DAY DIVISION.

Jerseys.

		Yrs. dys.	lb.	lb.	lb.
<i>Junior Two-year-old.</i> Alfalfa Neat Lady ..	N. A. Gunn, Rukubia	2 53	255·8	305	8,699·7
Punawai Lalique ..	V. Le Cren, Fairlie	1 307	250·5	305	5,993·7
<i>Senior Two-year-old.</i> Cecil's Pasadena ..	Miss A. M. Norton, Pukekura	2 334	308·9	305	8,670·9
H.O. Soumise Elfin ..	J. A. Ranger, Putaruru	2 146	265·1	303	6,867·2
Siwai Bonny Girl ..	Miss Court, Birkenhead	2 332	283·7	255	6,570·3
<i>Three-year-old.</i> Punawai Dorine ..	V. Le Cren, Fairlie	3 162	303·2	305	6,283·3
<i>Four-year-old.</i> Caledonia Holly* ..	W. P. Begg, Arapohue	4 274	350·9	305	9,610·0
Someview Sun Girl* ..	W. P. Begg, Arapohue	4 245	348·0	305	9,425·7

SECOND-CLASS CERTIFICATES.

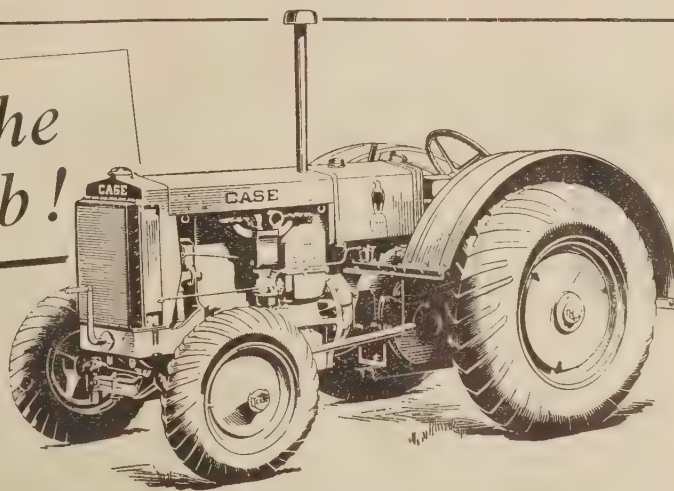
Jerseys.

		Yrs. dys.	lb.	lb.	lb.
<i>Senior Two-year-old.</i> Punawai Delphinette	V. Le Cren, Fairlie	2 133	263·8	305	4,692·0

* Relates to 1936-37 season's production, additional to yearly certificates.

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Judicious Harrowing of Pastures.

P. S. SYME, Instructor in Agriculture, Warkworth.

IT is interesting, if not surprising, to note how time can alter and modify even the strongest of convictions. As a rule, the change is gradual—the conviction becomes an opinion, and later, in the light of further experience, the opinion may be replaced by an attitude of conjecture.

So it has been with that very vexed and, at one time, controversial question of pasture-harrowing. A decade ago strong emphasis was laid on soil aeration and penetration, and there was a tendency to measure the efficacy of the harrowing by the apparent damage done to the sward. The ideal appeared to be something approaching to a grubbing, but performed with harrows.

Indiscriminate Harrowing.

From a theoretical point of view this practice appeared to many to be logical and desirable, and it was adopted with

enthusiasm for all classes of pastures. While the question of pasture-harrowing may, in some of its aspects, still be

considered as *sub judice*, a growing body of opinion now condemns the practice of the indiscriminate drastic harrowing of high-class rye-clover swards. It is contended that although in some respects this may be beneficial, on the other hand, there are definite and positive disadvantages, the chief one being that this may on occasions tend to promote the rapid establishment of certain noxious weeds, such as Californian thistle and ragwort.

There can be no question, however, that where the objective is limited to the efficient spreading of animal droppings nothing but good can result. From this point of view harrowing is not only desirable, but is vitally necessary, and the expense of evenly grazed and uniformly green sward seen on the well-managed farm may be regarded as one of the hall-marks of the good farmer.

Spreading Nature's Fertilizers.

Animal droppings are Nature's most valuable fertilizer, but, like other fertilizers, they must be evenly spread to give the best results; otherwise they are, to a large extent, wasted, and may even cause actual damage to the sward. To a great extent, good grazing depends on good harrowing. If certain patches receive an undue share of stock manure the resulting sward is unpalatable, while the rank growth, unchecked by grazing, is largely wasted and tends to suppress clover growth.

On the other hand, certain areas receive too little a share of the droppings. Fertility falls in consequence, growth is poor, and good grasses go out. Preferential



Fig. 1.—(a) A field such as this should be well harrowed to spread the droppings; (b) rank growth caused by unspread droppings is unpalatable to stock, resulting in patchy and uneven growth.

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grazing where the herbage is short still further punishes the grasses and favours the clovers, resulting in an ill-balanced sward of lowered productive capacity.

While some measure of agreement has now been reached regarding the type of harrowing best suited for good-quality pastures the question of how best to deal with certain low-producing, sod-bound swards still remains to be answered. For such, aeration and penetration appear to be essential precursors of sward improvement. Fertility must be raised and room must be provided to permit of the establishment and development of the more valuable pasture species. Drastic harrowing, combined with the application of suitable fertilizers, and, where necessary, with the surface sowing of good grass and clover seeds, has in many instances given excellent results, particularly where the dominant grasses are sod-bound *paspalum*, fog, or brown-top.

Harrowing Trial.

It should be pointed out, however, that, although severe harrowing of sod-bound pastures has sometimes been

attended with remarkable results, much depends on the exact conditions involved. The results are not invariably spectacular.

In a harrowing trial conducted at the Ruakura Farm of Instruction during the past year part of a sod-bound *paspalum*-rye-clover dominant pasture was severely harrowed and part was left unharrowed,

the herbage produced on each section being mown and weighed at frequent intervals. The result showed a production improvement for the year of only 8 per cent. in favour of the drastically harrowed area.

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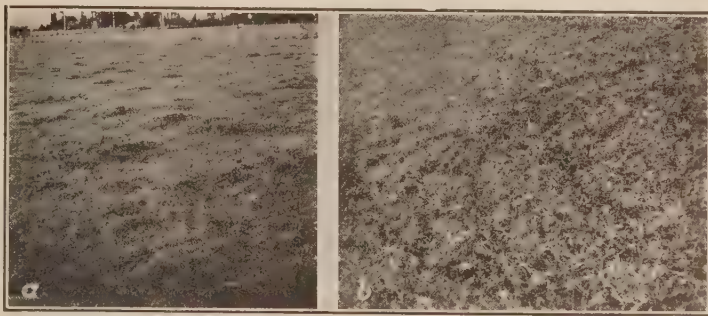


Fig. 2.—(a) A patchy and tufted sward resulting from lack of harrowing; (b) a harrowing trial at the Ruakura Farm Training College. Note the severe harrowing in the foreground.

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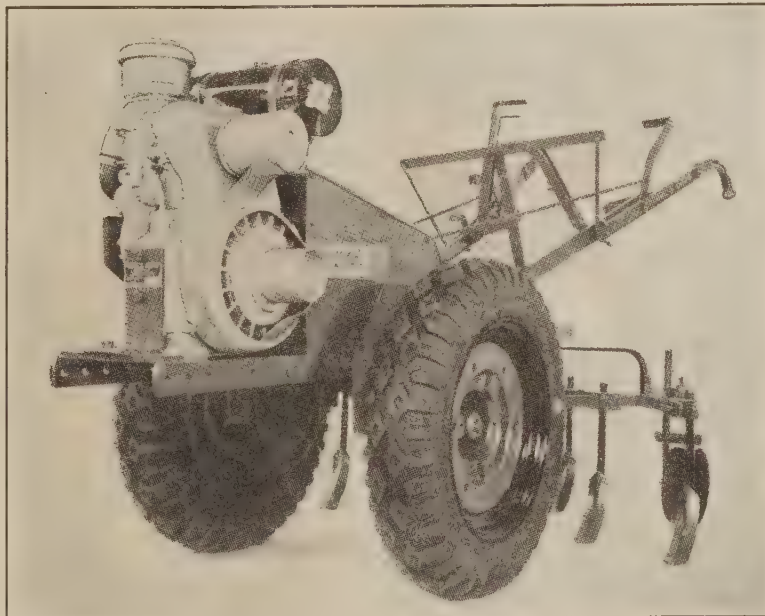
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Fire Hazards from Sodium Chlorate.

R. E. R. GRIMMETT, Chief Agricultural Chemist.

NOW that preparations for the coming season's campaign of ragwort destruction are being made it is well to take stock of the fire dangers to those who handle sodium chlorate.

At the moment no material is in sight which gives any promise of replacing chlorates in a general way as a ragwort-killer. Chlorates are used either in combination as the sodium or calcium salts or in various mixtures with other materials, such as calcium chloride, caustic soda, or carbonate of lime, which tend to reduce, but do not eliminate, the risk of fire.

The exact dangers incurred in the use of chlorates for weed-destruction have been explained in previous articles in the *Journal of Agriculture* and issued in summarized form as Bulletin No. 158, which is available free of charge on application.

Increased Quantity Used.

During the five years that have elapsed since these warnings were printed the

Care in the handling of sodium chlorate for ragwort-destruction is emphasized in this article, which discusses the ever-present risk of fire. It is stressed that dampness should be avoided in sacks containing lime-chlorate mixture, and that no workman should be allowed to travel in the body of lorries where such mixtures are being or have been carried.

quantity of sodium chlorate used annually has increased very considerably. No doubt the gangs of men employed for controlling ragwort on areas under supervision of public authorities become

skilled in the use of the material and rarely suffer from accidents. Casual farm hands or children are, perhaps, those most likely to be exposed to risks, the latter especially from their experimental proclivities. Those having charge of the material should do everything to avoid children having access to it, as "gunpowder," made by mixing it with certain inflammable materials, may be an excessively violent and dangerous explosive, and serious accidents have occurred in this way.

At times, however, even experienced workmen may suffer from certain of the less obvious dangers associated with the routine use of chlorate mixtures (see Vol. 42, page 200, March, 1931, and Vol. 46, page 230, April, 1933).

The "lime chlorate" mixture has become a standard one in many parts of the country, and, in general, is much safer to handle than unmixed sodium chlorate either in dry form or solution. Because of the fact that the chlorate is very soluble in water while the lime is

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not, however, any damping of bags containing it is likely to lead to the formation of a film of saturated chlorate solution on the surface of the lime particles. This solution travels by capillary attraction to the surface of the bag when the latter subsequently dries out. Thus the sacking may become impregnated with sodium chlorate and, when dry (for instance, after emptying in sunny weather) extremely inflammable.

Unusual Accidents.

Probably this was the reason for the somewhat unusual accident which is described in the following report received by the Director of the Live-stock Division from the Inspector of Stock, Paeroa:—

"Particulars of the accident are that ten workmen employed by the Ohinemuri County Council on ragwort work were returning to Paeroa on the evening of Thursday, the 3rd March, when the lorry in which they were travelling suddenly burst into flames. The lorry was unladen except for a number of bags which had contained lime-sodium mixture and which were being brought back for refilling.

"It is not known how the fire started. None of the men was smoking, under an instruction from the engineer at the beginning of the season, and which rule was carefully enforced by the foreman of the gang. The tailboard of the lorry was hanging down and swinging with the motion of the vehicle, and it is assumed that a little sodium must have got into position so that the friction from the swinging tailboard fired it.

"Five of the men were burned, but not seriously. The greatest injury was from contact with the metal road, the men having to jump blindly from the blazing lorry, which was travelling at about twenty miles per hour. The lorry was enveloped in flames so rapidly that there was no time to stop the vehicle to enable the men to alight.

"All the injured men were able to proceed to their homes after medical treatment except one, who was admitted to the Thames Hospital with, it is feared, a fracture of the skull. The other four were certified as medically unfit for periods of

from two to three weeks, and they are progressing satisfactorily.

"The County Council has handled between seven and eight hundred tons of the lime-sodium mixture since the start of the scheme in November, 1936, and this is the first accident."

Avoid Dampness.

The moral is that sacks containing lime-chlorate mixture should not be allowed to become damp, and if this happens they should be thoroughly washed in running water (as, for instance in a stream) and dried out before being used again. Any marked stiffness in dry bags that have been used for the mixture should be regarded with suspicion, as it may indicate that a crust of sodium chlorate has formed over the fibres.

A further and obvious precaution which should be observed is that no workman should be allowed to travel in the body of lorries where sodium chlorate or lime-chlorate mixtures, or bags which have contained them, are being transported.

✦ ✦ ✦

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Malting Barley in New Zealand.

Guide to Growers for High-class Grain.

J. M. SMITH, Fields Superintendent, Dunedin.

IN a country such as New Zealand there should be little difficulty in growing the whole of our requirements of malting barley. Yet, during the past decade, there has been a decided drop in the acreage of this crop, and the position has been that it has been necessary each year to allow heavy importations of malting barley in order to enable the maltsters and users of this crop to fulfil their requirements. This position is all the more remarkable in that our maltsters have stated repeatedly that, providing the barley is up to malting standard, they prefer New-Zealand-grown grain to the imported article.

The following table, showing the quantity of malting barley required by maltsters and brewers, the amount grown in this country, and the quantity it has been found necessary to import, clearly indicates the position:—

Year.	Total Barley required.	Amount Available in New Zealand.	Necessary Importations.
	Bushels.	Bushels.	Bushels.
1931-32 ..	450,573	419,771	30,802
1932-33 ..	434,856	426,842	8,014
1933-34 ..	423,384	302,220	121,164
1934-35 ..	497,271	314,775	182,496
1935-36 ..	585,601	551,131	34,470
1936-37 ..	689,656	346,800	342,856

Thousands of Bushels Spoilt.

It is felt that this position has been brought about largely through misunderstandings between growers and buyers, and because of a lack of appreciation on the growers' part as to what constitutes first-grade malting barley. It would be quite safe to say that each year thousands of bushels of what is potentially malting barley are spoilt through mishandling on the part of the grower and through lack of appreciation of the care that must be exercised at certain stages of production. This article has been prepared with a view to removing the misunderstandings that exist, and advising growers in the production of first-grade malting barley.

There is little necessity to dwell long on the subject of land preparation (Fig. 1) and general farming practices with regard to the growing of malting barley, for growers in the recognized

Although New Zealand should be able to meet all her malting-barley requirements, there are heavy importations each year. It is felt that this position has been brought about largely through misunderstandings between growers and buyers, and this article has been written with a view to clarifying the position and advising growers in the production of first-grade malting barley.

Marlborough, parts of Canterbury, North and Central Otago (Fig. 2), and the Garston district of Southland.

Districts other than these can produce high yields of barley, but it is often found that the grain is not suitable for the maltsters' purposes. With this knowledge, it is not fair to expect maltsters to purchase barley from districts such as these. It might be stated, however, that the Department of Agriculture has a number of trials under way in likely districts, other than those mentioned, to see whether there are other areas in this country where high-quality malting barley might be produced.

Question of Varieties.

With regard to varieties, it is pleasing to record that growers in this country are using those barleys which have proved most suitable for malting purposes not only here, but also in the main barley-producing countries of the world where conditions are somewhat similar to those of our own. The Agronomy Division of the Department of Scientific and Industrial Research, working in collaboration with the Department of Agriculture, is each year testing all new varieties evolved, and has planned to carry out some plant-breeding work with a view to determining

districts are employing methods which, generally speaking, leave little room for any suggested improvements.

The point with regard to "recognized districts" is worthy of note, however, for it must be appreciated that there do exist in this country, as in other countries, special districts which, because of their soil and climatic conditions, are admirably suited for the production of malting barley. These districts, as far as New Zealand is concerned, are the grain-producing districts of Nelson and



Fig. 1.—Preparing the land for planting barley.

[H. Drake, photo.]

whether it is yet possible to find varieties that will give heavier yields or improved grain quality.

Chevallier is a variety which, although selected as long ago as 1823, is still giving satisfactory results in this country. Its straw is long and, at times, weak, with a tendency to lodge in strong soils or in wet seasons. Under suitable conditions, however, it produces a plump grain of high malting-qualities. Plumage, which was introduced about 1919, found favour for a number of years, but it, too, was inclined to straw weakness.

Hybrids Most Popular.

The most popular and the most satisfactory varieties available to growers at the present time are the hybrids which have been evolved from some of the older varieties where cross-breeding has retained the desirable characteristics of both parents. In producing these hybrids, of which there are several, a variety known as Archer was used extensively as one of the parents. Archer has a stiff straw, a tough neck, and is short and well protected by the sheaf. When ripe, the head turns down and hangs parallel to the stem. It is weak in grain quality, however, having a small, greyish grain which does not make an attractive malt. Plumage, on the other hand, has a very attractive grain, but, as already indicated, has a weak straw. The cross of these two varieties, now known as Plumage-Archer, retained the grain characteristics of the Plumage and the strength of the Archer. This variety is grown extensively in districts where the ground is heavy and where weaker-strawed varieties would tend to go down.

A hybrid more suited to the lighter soils is Spratt-Archer. Here, again, the strength of the Archer straw was retained and the quality of the Spratt grain incorporated in the hybrid. A feature of

the Spratt-Archer is that it has retained the droop-head characteristic of the Archer, whereas in the Plumage-Archer cross this characteristic has been lost and the upright nature of the Plumage parent retained.

Another hybrid that has shown distinct promise is Goldthorpe-Spratt. This has proved a good yielder in the Marlborough District, while it has given decided promise in Garston. In Canterbury, however, Hewlett(1) has reported that its yields are lower than other standard varieties.

All malting barleys used in this country are of the two-rowed type, whereas in some countries, particularly in Canada, the six-rowed type is favoured. According to Calder(2), the reason for this is that the Canadian growers get a much higher yield from the six-rowed type, and, although the grain is not as satisfactory for malting, the maltsters are obliged to accept it even though it means that the malting methods have to be modified to suit this type of grain.



Fig. 2.—A fine crop of barley.

[H. Drake, photo.]

Rate of Sowing.

The rate of sowing has a more important bearing on the quality of the grain than most growers imagine. The farmer's object, as far as rate of sowing is concerned, is to get a braird thick enough to give maximum yield and yet not so thick that it will interfere with growth and strength of straw. Lancaster(3) points out that a thin sowing will give a coarse plant which, in turn, will mature only large, steely, unworkable grain. Wide planting also results in nitrogenous barley, which is not very acceptable to the brewer. Close planting, of course, can easily be carried too far, and no doubt experience has taught the growers what rate of sowing they should adopt for different soil types, for different varieties, and for different seasons of the year. From the foregoing remarks it can be readily appreciated that evenness in drilling (Fig. 3) both as regards rate of flow of the seed and in overlapping drill widths to ensure that the two outside drills are as evenly spaced as the remaining drills, is of great importance. With seed running unevenly, or with erratic driving of the drill as far as direction is concerned, some plants may have twice or thrice as much ground and air space as others. This means a very uneven grain quality, which is a bad feature.

Freedom from Smut.

Lines of barley produced in this country are relatively free from smut, and this is in marked contrast to some lines received from overseas. This is due largely to the action of seed-merchants in subjecting seed barley to treatment to prevent smut. The treatment to prevent loose smut is a hot-water treatment, which can be carried out only under expert control and in comparatively small quantities. One of the largest suppliers of seed barley has developed the technique

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of treatment of "mother seed," and can supply seed once or twice removed from hot-water treatment, which is an assurance of its freedom from loose smut. The other type of smut can be controlled by picking or dry dusting, and farmers using locally produced seed are advised to treat it with one of the approved methods before sowing.

Use of Pure Seed.

Just one further point is worthy of elaboration when dealing with varieties and sowing, and that is in connection with using pure lines of seed of high-producing ability. At times, cheap seed is utilized for sowing, while, again, some farmers make a practice of sowing seconds. The saving in cost so effected is very small, and such action might easily result in a greatly reduced yield or in the production of an inferior quality grain, both or either of which would result in a heavy financial loss.

As an example of what is liable to happen when impure seed is sown one might quote Hewlett(1), who states that there was a drop in the malt extract from 92.92 lb. of extract from 336 lb. of malt in 1918 to 82.20 lb. in 1919. This was due to impure lines of barley resulting from mechanically mixed seed which was being sown during the latter half of the war period and the immediate post-war period. Obviously, all varieties do not ripen at the same time, and a mixed crop must result in a percentage of unripe grain.

Importance of Manuring.

The question of manuring is important, for it has a bearing on both yield and quality. The question of manuring has raised considerable doubt in the minds of quite a number of growers, and this doubt has been intensified by some authorities suggesting that certain types of

manures develop undesirable characteristics in the grain from the maltsters' point of view. It is clear, however, that as far as malting barley is concerned the best crop from a yield point of view are also the best from the malting viewpoint. Lancaster(3) states: "The barley which gives the best crops has generally furnished the best malting sample, and although with wheat it has been found impossible to combine heavy cropping with standards most popular with the miller, fortunately the opposite is the case with barley." It would appear, therefore, that if we manure for yield and a strong straw we are not likely to interfere seriously with malting quality, and evidence to date would go to show that we would improve the malting quality.

The alleged danger is from excess nitrogen. Doubtless, too much nitrogen is not advisable for any grain crop, because an excess of nitrogen will result in a rank straw growth, with a tendency for the crop to lodge. On the other hand, a sufficiency of nitrogen is essential if a satisfactory yield and standard of quality is to be obtained. To begin with, none of our barley-producing soils is rich in nitrogen, nor do they contain sufficient to prevent the growing of malting barley. On the other hand, the addition of a nitrogenous manure in trials carried out has given an economic increase in yield and has not reduced the malt extract per bushel, but, with the increased yield, has increased the malt extract per acre of barley grown.

It has been stated that excess nitrogen results in hazy beer, and authorities agree that it is soluble protein (or nitrogen) that causes this trouble, but the group that does the damage has yet to be identified.



Fig. 3.—Drilling in the barley seed.

[H. Drake, photo.]

Grain Constituents.

The barley grain is made up of several parts, and the constituents may be divided into four groups:—

- (1) The starch, which is the main source of the sugar and is the most essential portion to the maltster, and comprises about 65 per cent. of the grain.
- (2) The nitrogen compounds, amounting to about 12 per cent. Obviously, the more nitrogen there is in the grain the less starch there will be, and the less starch the lower conversion to sugar and the lower the amount of malt extracted.
- (3) The cellulose and other non-nitrogenous compounds associated with the cell walls, amounting to about 10 per cent. These remain fairly constant and are not dissolved in the mashing process.
- (4) Ash constituents, fats, and other compounds present in small quantities.

It is, in the main, the starch that the maltster is depending on to get his malt, although a certain quantity of the nitrogen is also soluble. Therefore, the more starch there is present in a sample the greater will be the quantity of malt extracted, and, conversely, the lower the quantity of starch the lower the quantity of malt. The factor which lowers the starch is the percentage of nitrogen—more nitrogen less starch, less nitrogen more starch—so that it is obvious why maltsters object to grain with a high nitrogen content, and it is conceivable that this is the reason for the tendency to discourage the use of nitrogenous manures.



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Nitrogenous Manures.

We should remember, however, that it is necessary to have nitrogen present in the grain, and, as a rule, the proportion of nitrogen to starch remains constant. Therefore, a nitrogenous manure which will increase the yield but which will not interfere with the relationship between starch and nitrogen in the grain can be safely used, and to advantage.

As far as varieties are concerned, investigations have shown that for any given variety containing any given percentage of nitrogen the varying forms of nitrogen compounds are present in the same proportion. Therefore, a variety of barley with a high natural nitrogen content will retain this characteristic in proportion to the starch whether grown on a soil rich or poor in nitrogen. When the farmer adds nitrogenous manures the extra nitrogen usually leads to a corresponding increase in growth and carbohydrate production. This extra carbohydrate production balances the nitrogen taken up, and the nitrogen percentage is unaltered. When this happens, the farmer gets his extra yield without depreciation of quality.

Manuring Simplified.

This, then, simplifies the manuring of malting barley, and should correct that unfortunate impression that has been created, not only in this country but in practically all barley-growing countries, that the use of nitrogenous manures ruins the barley as a malting proposition. Not that the use of nitrogenous manure is always necessary or advisable, but where a dressing of up to 1 cwt. per acre of sulphate of ammonia is top-dressed in the spring on an autumn-sown crop and found to give a satisfactory increase in yield the farmer can give this dressing knowing that he is not interfering with the quality.

As far as other manures are concerned, superphosphate at the rate of 1½ cwt. per acre should be applied in the majority of cases as such manuring will almost certainly result in a payable increase in yield. Some farmers on the stronger soil types are afraid that the use of superphosphate will cause an excess growth of straw and that, as a result, the crop will lodge, but with the strong straw hybrids we have to-day there is little danger of this in a normal season.

References.

- (1) "Some Economic Effects of Scientific Methods in Malting Barley Production in Canterbury," by J. H. Hewlett.
- (2) "Report on Visit to Europe and Canada," by R. A. Calder.
- (3) "The Maltsters Materials and Methods," by H. M. Lancaster.

(To be continued.)

✧ ✧ ✧

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Objectives of Pig Recording.

Most Profitable Methods of Production.

M. J. SCOTT, Superintendent of the Pig Industry, and H. M. PEIRSON, Extension Officer in Pig Husbandry, Ruakura.

ONE of the best-developed human traits is that of publicly finding excuses for failures, and privately taking the credit for success.

The stock-raiser, while usually attributing his failure to all sorts of circumstances over which he has no control, seldom gets much sympathy when he blames his stock, with the result that he does his best to improve them and is always on the look-out for good animals.

Some are content to use improved stock under conditions of inferior management, but others, appreciating the necessity of giving better animals a chance of showing their worth, improve their conditions and reap a real reward. This is the greatest benefit that accrues from using better stock, and, as there is no occupation in which skill and attention on the part of the owner count for success more than they do in stock-raising, increasing emphasis has been placed on stock improvement.

Introduction of Schemes.

Until forty years ago the production of improved stock was left in the hands of pedigree breeders, with the live-stock judge in the show ring as the appraiser of quality. Under these conditions little information was supplied to the commercial stock-raiser about the production-capacity of stock, or of the circumstances under which maximum production was achieved, and this, coupled with a desire on the part of the trade for better-quality meat, resulted in the introduction of improvement schemes, which aimed at measuring growth rates and production-capacity of stock, and defining the circumstances under which the most profitable production is realized.

This latter use of pig recording is not sufficiently realized, and many who have not made use of, or have not thought about, pig recording may disagree with the opinions expressed above. Nevertheless, if the following pages are carefully perused it must be admitted that the information supplied about the ability of pigs to grow and utilize a feed-supply is most impressive, and that it constitutes a challenge to any producer "to go and do likewise." He will give the pigs he owns at the moment a try-out before he looks for better stock!

Definition of Pig Recording.

Pig recording has been defined as a process of finding animals whose progeny are capable of producing and continuing to produce in a given time a maximum amount of fat and lean meat of the best quality at a minimum of cost. This capacity to produce depends upon and is measured by the number of litters reared by a sow in a given time, the number of pigs in a litter, the weight of piglets at birth, the mothering-capacity of the sow, the mortality-rate of the pigs, the growing capacity of the survivors, the efficient utilization of feed supply, the fattening-capacity, and the quality of meat and fat. Man's assistance plays a big part in all these ventures, and they are discussed at length later.

As explained above in the definition, pig recording also aims at ensuring the continued inheritance of good performance, and this depends largely on the constitution and general make-up of the animal. This is difficult to measure, and can be done largely by judging the external characters of the animal and partly by delayed selection and breeding from old animals whose progeny have proved their worth to the second, third, and fourth generations.

Three Objectives.

To sum up, pig-recording achieves three objectives—first, the finding of better animals; second, the setting-up of standards of performance that may be used as commercial yardsticks by producers for measuring up the performance of their stock; and, third, the supplying of information about conditions under which the best cash returns are obtainable.

The first objective is achieved only when the conditions under which maximum production is possible are understood and practised. The actual procedure followed differs from country to country. In Denmark conformation and type are supervised at breeding-centres which cater for foundation stock; feeding performance and carcass-quality are tested at testing-stations. In Sweden, Canada, and England litters are tested and carcass-quality evaluated in slightly different ways. In New Zealand the Waikato and Manawatu pig-recording clubs tested litters and conducted feeding trials over a number of years on commercial and pedigree pigs.

The Department of Agriculture established a pedigree-sow-recording scheme in 1936, and consideration is being given at present to the question of a carcass-evaluation scheme which will make pedigree-sow recording complete. On the following pages the information collected by the Waikato Pig-recording Club is set out for the purpose of showing what pigs are capable of producing by way of litters, growth-rate, &c., and what use can be made of feed under ordinary farm conditions.

Results Obtained.

Having made the general observation that care on the part of the owner is all important, it is necessary to follow it up with details which demonstrate this fact to those who doubt its authenticity, and to correct the wrong impressions that any or every one may have gathered from observation of one or two of his own sows.

For example, every one must have seen how well a litter, whatever the size, sometimes grows and at other times how badly, in spite of the care bestowed. Many have formed the opinion that sows are best left to themselves. This is the tragedy of present-day pig-production, and if a perusal of the following table makes only a few converts it will have served its purpose:—

Table 1.—Production of Sows.

	1932-33.	1935-36.
Number of litters	159.0	309.0
Averages of—		
Number born	9.3	9.3
Number weaned	7.1	7.3
Percentage mortality	23.6	21.5
Weight, litter at three weeks (lb.)	76.8	75.0
Weight per piglet (lb.)	10.8	10.1
Weight, litter at eight weeks (lb.)	246.0	237.0
Weight per piglet (lb.)	34.7	32.7

This table shows what the average sows are capable of producing. The loss is most striking. The causes of death were specially noted for 371 pigs. They are as follows: Overlain, 187; born dead, 104; died at birth, 40; runts, 26; other causes, 14.

The fact that many pigs die between birth and weaning is well known. This table shows how many, and puts the percentage at about 20 to 25, half being overlain, chiefly because of clumsy overfat or irritated sows unaccustomed to their surroundings. This loss is preventable by consideration on the part of the owner, and, if eliminated, would result in a real source of profit.

Variations Observed.

The following table is worth careful study, as it shows the variation that occurs in production, the good results arising from careful owner-attention, and the disasters associated with neglect. It has been established beyond question that more than 90 per cent. of this variation is due to the amount of care given by the owner. Nearly every sow is capable of doing as well as the average; 80 per cent. can, with the assistance of the owner, do as well as the best!

Table 2.—Variations in Sow-production.

	Highest.	Lowest.
Litter-weight at three weeks	199.0 lb.	33.0 lb.
Weight per piglet	18.1	4.7
Litter-weight at eight weeks	55.6	89.0
Weight per piglet	50.1	12.7
Piglets—		
At three weeks	22.0	4.7
At eight weeks	59.5	12.7
	(3 in litter)	(7 in litter)
Herd average litter at fifty-six days	326.0	181.0
Weight per piglet	39.1	25.1
	(3 sows)	(21 sows)

It will be seen from this table that the average weight per pig at twenty-one days varies from as low as 4.7 lb. (seven pigs) to as high as 18.1 lb. (eleven pigs), resulting in a corresponding average weight per pig at fifty-six days of 12.7 lb. and 51.1 lb. respectively. While breed and strain do play a part in production, management has a far greater bearing on the results achieved in any one litter.

Analysis of Sow-production.

The next point worth considering is how the average is made up. For purposes of displaying this, litters are arranged in weight-groups, with 50 lb. differences (at eight weeks) between each group. The whole table is worth careful study. The percentage loss of piglets from birth to weaning falls from 51 per cent. in the worst cases to 5 per cent. in the best cases. The weight at weaning rises over the same range from 29.5 lb. to 39.9 lb., and the production per sow from 126 lb. to 422 lb.

No stronger case could be made out for the necessity and value of attention. It is not always the sow's fault that she has a poor litter, as in nine cases out of ten she can produce a good litter when she next farrows. Where neglect occurs at and before farrowing, subsequent attention is a disappointing waste of time.

Table 3.—Averages of Litters at 50 lb. Intervals.

Eight Weeks (Litter-weight).	Number of Litters.	Pigs.		Loss Percent- age (Birth to Weaning).	Weights at					
		Born.	Reared.		Three Weeks.			Eight Weeks.		
					Litter. (6)	Piglets (7)	Litter. (8)	Piglets (9)	Sixteen Weeks. (10)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
lb.										
101-150 ..	46	8.8	4.3	51	41	9.5	126	29.3	84.3	
151-200 ..	82	8.0	5.6	30	59	10.5	178	31.8	88.0	
201-250 ..	101	9.1	6.8	25	78	11.5	218	32.1	89.3	
251-300 ..	105	9.5	7.9	17	87	11.0	274	34.7	92.0	
301-350 ..	76	10.5	9.3	11	98	10.5	328	35.3	98.0	
351-400 ..	38	11.0	9.5	13	120	12.6	374	39.3	95.7	
401-450 ..	19	11.2	10.6	5	132	12.5	422	39.9	112.0	
Total ..	467	4,414	3,440	..	..	..	..	..	..	
Average of lit- ters—										
Under 250 lb.	229	8.6	5.8	34.8	58.5	9.9	185	31.5	..	
Over 250 lb.	237	10.2	8.8	13.7	99.3	10.7	361	41.0	..	

It will be seen from the previous table (columns 7 and 9) that the eight weeks' weight is slightly more than three times the three weeks' weight. A difference of one or two pounds at three weeks becomes 3 lb. to 8 lb. at forty weeks. No magic wand or fortuitous circumstance after three weeks makes up for inattention before three weeks. Although the sow is the sole source of the litter's feed-supply up to three weeks—and for this reason her worth is judged by the three weeks' weight—nevertheless warmth and cleanliness are helpful factors in good production and with these, plus good health and adequate feed, most sows can produce good three weeks' weight. Those that cannot do so should be discarded.

Good weights at eight weeks are obtained by creep feeding of the litter as soon as they can be encouraged to start feeding. A little whole milk for a few days, followed up by skim as soon as they clean up the trough, plus a little meat-meal gradually introduced and increased up to $\frac{1}{2}$ lb. per pig per day at weaning, ensures good weaning-weights provided that scours, worms, and chills are avoided.

Good Eight Weeks' Weights.

It is ten years since New Zealand led the world by advocating the advantages of getting good weaner-weights. The reason for advocating this was simply that pigs at sixteen weeks old were generally two and a half times as heavy as they were at eight weeks. The heavy weaner became a porker at sixteen weeks old, and the 20-pounder was only 50 lb. alive at sixteen weeks and required another six or seven weeks' feeding to make him saleable. During the last ten years many other countries have investigated the effect of heavy weaning-weights on subsequent thrift, and the most telling advantages are those advocated in England—viz., that pigs of good weaning-weight seldom suffer a setback as they grow, whereas those of light weaning-weight are subject to setbacks due to worms, lung-trouble, lack of vitamins, &c., that take their toll because of lowered vitality and inability to resist infection.

The idea of getting good weights at eight weeks served its purpose, but it only told half the story. The objective should have been good weights (100-pounders) at sixteen weeks. Few pigs are so badly abused as are weaners in New Zealand to-day. Usually they are turned out or neglected until they have grown a little, and those that survive the ordeal are brought in to feed and finish when they have reached a store weight of about 70 lb. alive.

Attention Necessary.

Had the ideal been good pigs at sixteen weeks, the present abuse of weaners might have been mitigated, and the fact that pigs are babies until they are four months old might have been established with very considerable advantage to the industry. Attention given to pigs until they are four months old is almost as valuable as that given to sows at and prior to farrowing. Recognition of this fact and improvement in this direction are among the urgent questions of the day.

If further evidence were necessary of the importance of owner-attention it is forthcoming from the poor results obtained during haymaking, Christmas, or other holiday time. Pigs making a daily gain of 1 lb. to 1 $\frac{1}{2}$ lb. drop at Christmas or hay-making to $\frac{1}{2}$ lb. or even to zero per day. Sows which produce a good first litter are often penalized when they farrow during the holiday or haymaking seasons.

The pigs from these starved litters, which should reach porker weights before the close of the season, have to be carried through the winter on maintenance rations, thereby using up the early season production and skim-milk or whey that is required for the early farrowing sows. The repercussions of a few days of inattention are far-reaching.

Production Costs.

So much for the animal's performance and the part man plays in her achievement. What about the feed used and expenses associated with supplementing it? Farmers ask for

information on these questions at lectures and demonstrations. Information collected in the course of litter recording has thrown considerable light on these aspects of pig-production. The information has been assembled in the following tables for weaner-production, for pork-production, and for baconer-production, with skim-milk as the basic feed, and for the first two with whey as the basic feed supply. Table 4 sets this out for weaner-production on skim-milk.

Table 4.

			1931-32.	1932-33.	1933-34.
Number of litters	..	..	43	76	213
Pigs weaned per litter	..	..	7.8	7.68	7.4
Skim-milk (gallons)—					
Per litter	..	..	670	690	661
Per pig	..	..	86	90	89
Meals used (lb.)—					
Per litter	..	..	173	161	143
Per pig	..	..	22.2	21	19
Total feed used—					
Per litter	..	..	843	863	804
Per pig	..	..	108	115	109
Cost of meal used—					
Per litter, at £14 per ton	..	..	259d.	241d.	214d.
Per pig, at £14 per ton	..	..	33d.	31d.	29d.

The return given above includes the feeding of the sow twenty-one days before farrowing and during the suckling-period. Calculations are based on 1 gallon of skim-milk being equal to 1 lb. of feed.

It is shown that a weaner is produced on approximately 100 lb. of feed. Large litters are produced more economically than small litters. The only outgoings are those for purchased feed-stuffs used, with and meals and concentrates at £14 a ton this cost is 2s. 6d. per pig weaned. A weaner worth 14s. is produced for a feed cost of 2s. 6d., and shows a return of just over 14d. per gallon for skim-milk.

Porker-production.

Skim-milk.

This table sets out the growth-rate, &c., between the weaner and porker stages. The information, collected as it was in more or less a rough and ready way, shows very little variation from year to year. The pigs were weighed at fourteen-day intervals, and the information, given by the farmer carrying out the trials, in respect to the amount of feed used was accepted, although the amount to be used was laid down by the Recording Officer at each weighing.

Table 5.—Weaner to Pork Period.

	1931-32.	1932-33.	1933-34.
Number of trials	18	23	70
Number of pigs	141	190	629
Weight at fifty-six days (lb.) .. .	33	38	36
Final weight (lb.)	99·3	107	106
Weight increase (lb.)	66·3	69	70
Final age (days)	117	119	119
Rate of gain per day (lb.)	1·09	1·09	1·11
Feed consumed per pig; milk (gals.)	137	206	168
" meal (lb.)	34	33	40
Feed per 100 lb. live-weight .. *260	300	297	
Cost of meal used per pig (£14 per ton)	4s. 3d.	4s. 2d.	5s.

* NOTE.—The theoretical minimum feed requirement per 100 lb. live-weight increase over this weight range calculated from Wood's tables ("Animal Nutrition," T. B. Wood, 1934) is 285 lb. of feed of barley quality. The quantity stated here, chiefly skim-milk, contains more than the requisite energy to produce 100 lb. of live-weight.

The table deals with 111 trials, representing 960 pigs, which show an average gain of 69.8 lb. of live-weight in sixty-three days on a feed consumption of 171 gallons of skim-milk, plus 38 lb. of concentrates. With meal at £14 per ton the cost of supplementary feeding between the weaner and porker stages is 4s. 9d. per pig. These, added to the figures already obtained for weaner-production, give the following result:—

Table 6.—Feed used and Production Costs per Pig:
Birth to Pork Stage.

			Skim-milk. Gallons.	Meal. lb.	Meal Costs. s. d.
Weaner ..	..	..	89	19	2 6
Porker ..	..	..	171	38	4 9
			—	—	—
Total	..	..	260	57	7 3

A pig of 105 lb. live-weight is produced on 317 lb. at a cost for meal purchased of 7s. 3d. Allowing for the trade deduction of 33 per cent., 70 lb. of pig-meat is produced, which, at 6d. lb., realizes 35s., leaving a net return of 27s. 9d. after deducting the cost of meal used. The dairy-farm by-product now has a value of 128d. per gallon for the 260 gallons fed.

Baconer-production.

This table sets out the feed used between the pork and bacon stages.

Table 7.—1935-36.

Number of Trials.	Number of Pigs.	Final Weight.	Weight-increase.	Days on Trial.	Food used per Pig.	
					Skim-milk.	Meal.
9	63	lb. 180	74	56	Gallons. 34 ⁶ / ₁₆	lb. 37

During this period the meat increase is equal to 61 lb., and by the same calculation as before skim-milk returns 0.9d. per gallon after paying for meals used.

These three stages can now be summarized as follows:—

Table 8.—Feed used and Productive Costs.

	Weight.	Days old.	Feed used.		Cost of Meal at £14 per Ton.	
			Skim-milk.	Meal.		
	lb.		Gallons.	lb.	s.	d.
To the weaner stage ..	36	56	89	19	2	6
From weaner to pork stage	110	122	171	38	4	9
From pork to bacon stage	180	178	346	37	4	7
Total feed used—birth to bacon stage			606	94		
Grand total			700			
Total cost of feed bought ..					11	10

From this table it will be seen that the over-all return for skim-milk used for baconer-production is apparently 1·06d. per gallon after paying for meals used.

Profitable Feeding.

Whey.

Whey, a by-product much despised as a pig-food by many farmers, can be used profitably when greater quantities of supplementary food are added.

The following table sets out the results obtained with whey for the production of weaners:—

Table 9.

	1931-32.	1932-33.	1933-34.
Number of litters ..	17	28	91
Number of pigs ..	118	182	641
Pigs per litter ..	7	6.5	7.5
Meal used (lb.)—			
Per litter ..	201	182	175
Per pig ..	29	28	25
Whey (gallons)—			
Per litter ..	1,107 (553)	994 (497)	1,046 (523)
Per pig ..	160	153	150
Total feed used—			
Per litter ..	754	679	698
Per pig ..	109	104	92
Cost of meal used—			
Per litter (at £14 per ton) ..	302d.	273d.	262d.
Per pig (at £14 per ton) ..	43d.	42d.	37d.

Comparing these results with those in Table 4, it will be seen that, with whey, meal-consumption per pig does not differ much from that used with skim-milk.

Allowing 30 lb. of meal per pig, the return per gallon of whey calculated by the procedure used previously for skim-milk is approximately 0.80d. per gallon after paying for meal used.

Table 10.—Feed used and Production between the Weaner and Porker Stages.

	1931-32.	1932-33.	1933-34.
Number of trials ..	7	30	15
Number of pigs ..	62	290	151
Weight at fifty-six days (lb.) ..	39	38	36
Final weight (lb.) ..	87	100	108
Final age (days) ..	107	123	128
Gain per pig (lb.) ..	0.94	0.93	1.00
Feed consumed per pig—			
Whey (gallons) ..	151	300	282
Meal (lb.) ..	58	58	55
Feed to produce 100 lb. live-weight	280	335	272

The table deals with fifty-two trials, representing 503 pigs, which show an average live-weight gain of 63 lb. in sixty-six days on a feed-consumption of 275 gallons of whey (equivalent to 138 lb. of feed) and 57 lb. of meal (mostly meat-meal). With meal at £14 per ton the cost of bought feed between the weaner and porker stages is 7s. 1d. These figures, added to those set out in Table 9 for weaner-production, give the following:—

Table 11.—Feed used and Productive Costs to Porker Stage.

	Whey. Gallons.	Feed Equivalent.	Meal. lb.	Meal Costs. s. d.
Weaner ..	150 =	75	25	3 1
Porker ..	275 =	138	57	7 1
Total ..	425 =	213	82	10 2

Feeding of Concentrates.

Many farmers are still under the impression that the feeding of concentrates is a costly business. If concentrates are judiciously fed in conjunction with dairy-farm by-products the cost is not excessive. More important than the cost is the increased return as a result of more pigs fed on the by-products available, heavier weaners, more thrifty porkers and baconers, and a general easement in adjusting pig-numbers to feed-supply. When allowance is made for feed bought, the revenue from

weaner production for skim-milk, making no allowance for time or overhead costs, is 1½d. per gallon for skim-milk, or 3½d. per pound butterfat. For pork, the revenue is 1.28d. per gallon, and for bacon, 1.06d. per gallon respectively. For whey the earning-value per gallon from weaner and from pork production is 0.87d. and 0.55d. respectively.

These figures are not intended to be an order of merit for pig-production or to represent the actual net returns on a farm. Weaner-production means more overhead in sows and equipment. The sow has to be fed between litters for eight months, and even though she lives on grass or other home-grown feeds during this time, some cost has to be reckoned with on this score. As pointed out on many other occasions, the returns from skim-milk are similar, whether weaners, pork, or bacon are produced, when the prices for these are 14s. for weaners and 5d. per pound for pork and bacon.

These returns are calculated on no waste occurring in the use of skim-milk or whey, and this is best achieved when something between ½ cwt. and 1 cwt. of meal is used for pigs for every cow milked, and is most easily achieved when weaners are being produced. The value of meal is further confirmed in a recent survey of a number of farms, which gave the following results:—

Table 12.

Pig-meal used per Cow milked.	Gross Revenue for Skim-milk per Gallon.	Net Revenue for Skim-milk per Gallon, after paying for Meal used.
1 cwt.	d.	d.
45 lb.	1.232	0.980
12 lb.	0.912	0.800
	0.712	0.680

How Many Cows per Sow?

This is a further problem about which frequent inquiries are made. The figures obtained above make it possible to give some information on the subject.

From Tables 4, 5, 8, and 9 respectively it will be seen that—

(1) For the production of weaners with skim-milk where dry sows are kept in the paddocks, one could be kept to every 2½ cows.

(2) If 2½ gallons of milk per day were allowed per sow during the dry period, then one to 3½ cows would be the ratio for weaners; with whey, one to every four cows where the dry sows get no whey, or one to every six cows if an allowance of five gallons per sow is made.

(3) For pork-production, one sow to seven cows on skim-milk, or one to eleven cows on whey.

(4) For baconer-production, one sow to fifteen cows on skim-milk, and one to twenty-four sows on whey.

What Prices Can be Paid for Meal?

Producers are naturally concerned about getting their meal-supply as cheaply as possible, and, actuated by this idea, they frequently lose sight of quality in their efforts to buy cheap or low-priced meal. Low-priced meal, £6 to £7 per ton, is invariably high in fibre, and is consequently low quality from the point of view of supplementing dairy by-products. It always pays to buy the best-quality meal and to use it sparingly.

In the following table, based on these data collected from farms, is set out the returns for skim-milk for porker-production —i.e., 70 lb. of carcass for 260 gallons of milk, and 57 lb. of meal at different prices for pork, and at two prices for meal, £8 and £14 per ton.

Table 13.

Price of Pork (Pence per Pound).	Revenue from One Gallon of Milk (Pence) after paying for Meal used.	
	Meal at £8.	Meal at £14.
3	0.64	..
3½	0.75	0.61
4	0.88	0.74
4½	1.02	0.88
5	1.15	1.01
5½	1.29	1.15
6	1.43	1.28
6½	1.56	1.42
7	1.69	1.55
7½	1.83	1.69

At a rough guess one might have conceded the point that it would be profitable to use meal at a cost increasing by £1 per ton for every ½d. increase in pork prices. Thus, pork at 3d. per pound, meal at £8; pork at 6d., meal at £14 per ton. From the table it is evident that every increase of ½d. in the price of pork would allow for an increase of £6 per ton for meal and give the same returns for skim-milk. No producer would be content to take threepenny returns for pork when pork prices are 6d. per pound, but when he uses meal at £14 per ton and pork is 6d. he is getting five-sixths of an increase that arises from the increased value of pork. The other one-sixth goes to the grain-producer, and it is unreasonable to expect, when pork is 6d. per pound, to purchase supplementary feeds at a price equal to that paid when pork is only 3d. per pound.

Good prices must be shared by all, and the producer of grain is entitled to his share. Bickerings about the cost of meal and the returns from feeding it will go on until the end of time, but the results obtained in these trials indicate that at present prices it can be used so as to give an increased return for dairy by-products of approximately 25 per cent. better than the returns now being obtained.

Returns from Farms.

Readers may be inclined to say that the returns obtained from a few pigs fed under more or less careful conditions are no indication of what all the rest of the pigs on the farm are capable. To offset this point the total production details of twenty-six farms are set out in the following table.

The information contained therein shows that on these farms, at least, the returns for skim-milk are as good as, or even better than, those obtained from the trial-feeding lots. These farms were those of recording members, and to that extent represent the production of people who were more interested than the average.

Table 14.—Records of Twenty-six Farms.

	Year 1931-32.	Year 1932-33.	Year 1933-34.
Number of farms	8	9	9
Averages—			
Cows per farm	50	57	59
Butter-fat per acre (lb.) ..	112	123	134
Butterfat per cow (lb.) ..	230	237	269
Calves reared	16	15	13
Skim-milk for pigs (gallons) ..	20,150	25,520	27,640
Sows per farm	7	7	9
Cows per sow	7	8	6.5
Pig-meal sold (total)	4,827	7,610	8,612
Pig-meal per sow (lb.)	689	1,087	957
Pig-meal per 100 lb. butterfat	42	54	54
Meal used (lb.)	2,840	6,677	8,284
Milk used } for 70 lb. carcass	290	235	225
Meal used } = 100 lb. live-weight	40	57	67
Returns per gallon milk (as before)	1.24	1.42	1.42

Apart from substantiating the claim that the returns obtained from feeding-trial lots of pigs are obtainable under actual farming conditions, these figures show that the returns for skim-milk, with meal at £14 per ton, increase when a greater amount of meal is fed, chiefly because of an increase in the efficiency of feed utilization—i.e., a reduction in the consumption of feed required to produce 100 lb. of live-weight.

The table is worth careful study to discover the expenditure on pig-meal per sow and per cow and the proportion of the total revenue on a dairy-farm that pigs are capable of earning. This amounts to slightly over 20 per cent. on the average of these farms.

Pig-recording under the cloak of finding the best animals can also serve a most useful purpose in setting standards for the performance of the animal, standards for the utilization of feed supply, and standards for the gross earning-capacity of pigs. Until these standards are known and applied the task of finding the best animals is almost impossible.

Wintering Store Pigs.

"Agricola" (Waharoa) asks, What is the best method of wintering twenty store pigs at present in good condition? I have no supplementary feed other than the milk from about twelve strippers. In view of the indifferent quality of some of the pollard of recent times, would feed-oats steeped in boiling water be superior?

The Live-stock Division states that there is always likely to be a difficulty in carrying pigs over the winter where no root crop is provided to serve as a basic food in place of skim-milk or whey. At

the same time, if the pigs are allowed a good grass paddock and are given a ration of molasses and meat-meal twice daily it will be found possible to carry them through in good healthy store condition, providing always that good housing-accommodation is available.

The method of feeding is to mix 12 lb. of molasses and 40 gallons of water together with the milk available. Give the pigs as much as they will drink, in addition to ½ lb. of meat-meal per pig at each of the two feedings. Not only do pigs require plenty of protein, but the

protein must be of the right kind. Meat-meal provides this, and it is favoured in preference to any other food, such as oats, as suggested. On such a diet, sows with litters have been carried through the winter without milk or whey.

In respect to the relative feeding value of pollard and oats, pollard is preferable providing one can purchase a good sample. Oats are too fibrous for little pigs, although quite satisfactory for sows and mature pigs.

♦ ♦ ♦

Subterranean Clover Survey.

J. P. BEGGS, Fields Division, Hastings.

(Continued from August issue.)

Growth in Various Districts.

Canterbury Plains, North Canterbury, and North Otago.

THESE three areas may conveniently be grouped together as having roughly similar conditions. There are large variations in soil-type from place to place, but it is mainly the lighter types

clover from three to ten years are generally of the opinion that they have obtained more seed from the subterranean clover than from ordinary pasture under conditions which are not suited to the establishment of a first-class pasture. Also, the accumulated beneficial effect of the clover on the soil over a number of years is to be considered.

For these areas the Mount Barker strain appears to be most suitable, though good results would probably be obtained with Tallarook. Dwalganup cannot be recommended. It is preferable to sow before April, and earlier than March if possible.

Lake Tekapo Region.

The Lake Tekapo region is characterized by its high altitude, this being approximately 2,500 ft. The result is that an early and a severe winter is experienced, some frosts being below zero. The average annual rainfall is approximately 20 in. to 22 in.

Results from subterranean-clover growing in this district are inconclusive, and further trial is necessary. The time of sowing would appear to be the important factor here. The seed should be sown in December or January. Even the latter half of January is possibly rather late, and sowing before the middle of January could be recommended.

Naturally, good results from subterranean clover could not be expected here as in the warmer districts, but if subterranean clover could be established successfully among the tussocks it would prove of great value.

Hakataramea and Omarama Districts.

The Hakataramea and Omarama districts may be grouped together as having roughly similar conditions. The annual



Fig. 1.—The oldest patch of subterranean clover seen on the survey. Twenty years ago the farmer merely threw out a small sample of seed and then forgot about it. Now it forms quite a large patch.

of soil with which we are concerned for subterranean-clover growing. Also there are slight differences in climatic conditions, but in all parts there will be an annual rainfall of over 20 in.

It may be broadly stated that subterranean-clover growing can be successfully practised throughout the area that comes under the above heading, and from results obtained during the last two years at least it would appear definitely beneficial to grow this clover on much of the lighter land. On the heavier land wheat is extensively grown, and better results would probably be obtained from the use of certified white clover and Montgomery red clover than from subterranean clover.

As regards results over a longer period, farmers who have grown subterranean



Fig. 2.—A paddock of subterranean clover which has been down for nine years. No manure was applied since sowing until July, 1936, when 1 cwt. of superphosphate per acre was applied. The white triangular portion on the right received no manure.

rainfall is low. Figures for Omarama were unavailable, but in different parts of the Hakataramea the rainfall varied from about 15 in. to over 20 in.

The Mount Barker strain was found doing well where the average fall was 17.77 in., but it was only sown last autumn. The rainfall to the end of October was 11.36 in.

There were no old sowings in these districts, however, except for a six-year-old stand under irrigation. This was doing well. Further trial is needed in both the Hakataramea and Omarama districts. There is a large area of light, dry shingly flat in the Omarama district where the Mount Barker strain would probably not be successful, but where Dwalganup strain might possibly prove useful. Also, this strain may prove satisfactory for the drier parts of the Hakataramea. If it could be grown successfully it would be of great value in these parts. As these are cold districts, early sowing as for the Tekapo region is advisable.

Canterbury Foothills.

The rainfall on the Canterbury foothills is generally higher than on the plains, and the important factor as regards subterranean-clover growing is the colder conditions. Subterranean



Fig. 3.—Typical Central Otago land, with practically no growth but scab-weed. If subterranean clover could be established on these patches it might gradually spread outwards.

clover has not yet been tried for any length of time. A number of failures have been experienced, but in these instances the time of sowing was usually at fault.

The important point in establishing subterranean clover in these colder parts is early sowing, and the clover was found growing quite well on areas where early seeding had been carried out. December

or January sowing would be advisable in these colder areas so that the young plants can obtain a good start before the cold weather sets in. The latter half of January is really rather late in the higher, colder regions.

It will be obvious that production will not be as high as in the warmer districts, but the clover has shown very good frost resistance and, if sown early, it may

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prove quite satisfactory in these colder parts. Further trial is necessary to give satisfactory conclusive results.

Central Otago.

The limiting factor in Central Otago is moisture, the annual average rainfall at Alexandra being only 12.11 in. Also, cold conditions are experienced in the winter.

It is obvious that if subterranean clover is to prove of value in Central Otago it must be capable of growing satisfactorily under the existing climatic conditions, for if the land is irrigated, as much of it is, the other clovers can be grown successfully. White clover, for example, does very well here under irrigation and produces much more feed than would subterranean clover. In fact, on irrigated land where subterranean clover and white clover have been grown together the latter has largely smothered out the former.

Nearly all the trials with subterranean clover in the drier parts of Central Otago have been failures. It would appear that conditions are too dry for successful subterranean-clover growth. In most instances the trials visited had been laid down in the spring—October and November. In one instance the Dwalganup

strain was sown in the spring and was a failure. On another area, however, where it had been sown in the early autumn of 1937, the results appeared more promising.

At the time of visit—November—the clover was doing well and reseeding prolifically, the seed being practically matured in the burrs. It should be noted that the rainfall to date was below normal at this place. This is only one example, and it cannot be taken as definite evidence that the Dwalganup strain will prove successful in this region. However, in view of the fact that sufficient experimentation with this strain has not been carried out here, the success of this sowing might be taken to indicate that there may be possibilities in the use of the Dwalganup strain in localities where conditions are too dry for the successful growth of Mount Barker.

The growth of plants on the scabweed, which is so plentiful in this district, is of interest. It is found that subterranean-clover plants or other plants will establish and grow much better on patches of this weed than they will on the bare soil. If the clover could be established on these patches it would probably do well and spread outwards from them. It would probably be advisable to sow in December or January in this district.

At Ranfurly, where the average rainfall is about 15 in., a stand of Mount Barker was quite promising. This was sown down several years ago in the late summer. No special treatment or spelling for reseeding was given to the area. In spite of this the clover was quite thick in patches and growing well. At the time of visit the patches were conspicuous through the flowering of the subterranean clover. If proper treatment and spelling had been accorded this pasture there would probably have been a much better cover of clover.

Conclusion.

It would appear from the results of the survey to date and from opinions of farmers who have grown subterranean clover for a number of years that this clover could play a very useful part in the farming of much of the lighter land of Canterbury and North Otago. It is realized that results will not always be as good as they have been in parts of Canterbury in the last two seasons. However, on land where first-class pasture cannot be established, farmers with old stands of clover generally agree that production has been higher in bad seasons from subterranean clover than from ordinary pasture.



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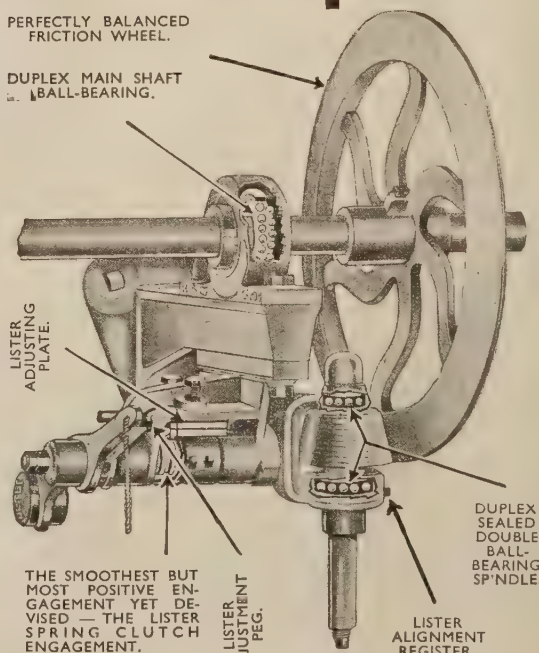
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Grading of Export Butter and Cheese.

Leading Dairy Factory Averages for the Year 1937-38.

Dairy Division.

BUTTER-manufacturing companies which have obtained an average grade of 94 points or over and cheese-manufacturing companies which have obtained an average grade of 93 points or over are listed below.

Of the total 169 creameries or dual-plant factories manufacturing butter for export, 29 are included in the list, as compared with 34 for the previous year, and of the 283 cheese-factories and dual-plant factories manufacturing cheese for export, five, as compared with twenty-two for the previous year, have averaged 93 points or over.

Of the total factories listed, 19 butter and two cheese factories are situated in the North Island, and 10 butter and three cheese factories in the South Island.

Company or Proprietor.	Reg. No.	Brand.	Tonnage graded.	Ave. Grade.
Butter.				
Murchison Co-op. ..	1888	Airship ..	269	95.059
Taieri and Peninsula Milk Supply Co., Ltd.	54	Sweet Briar, &c. ..	11	94.930
Rangiwahia Co-op. ..	750	Quail ..	84	94.789
Rangitikei Co-op. ..	1360	Rangitikei ..	413	94.700
Rodney Co-op. ..	394	Rodney ..	593	94.687
Collingwood Co-op. ..	1234	Golden Hills ..	246	94.650
Kaikoura Co-op. ..	302	Kai ..	326	94.639
United Co-op. ..	1296	Whariti ..	380	94.616

Company or Proprietor.	Reg. No.	Brand.	Tonnage graded.	Ave. Grade.
Butter—continued.				
Karamea Co-op. ..	1370	Karamea ..	251	94.541
Golden Bay Co-op. ..	146	Sovereign ..	719	94.528
Inter-Wanganui Co-op. ..	6	Inter Wanganui ..	152	94.526
Eketahuna Co-op. ..	46	Eketahuna ..	184	94.507
Northern Wairoa Co-op. ..	4	Northern Wairoa ..	590	94.488
Awahuri Co-op. ..	564	Red Rose ..	824	94.479
Rata Co-op. ..	938	Rata ..	964	94.366
Kokatahi Co-op. ..	1144	Kokatahi ..	40	94.338
Levin Co-op. ..	910	Lake ..	1176	94.321
Golden Coast Co-op. ..	991	Golden Coast ..	155	94.295
Taihape Co-op. ..	1188	Tikapu ..	412	94.281
Masterton Co-op. ..	1307	Masterton ..	622	94.232
Maungaturoto Co-op. ..	1407	Otamatea ..	1148	94.206
Wangaehu Co-op. ..	1326	Wangaehu ..	578	94.179
Wairoa Co-op. ..	1343	Wairoa and Clyde ..	427	94.172
Kuku-Manakau Co-op. ..	905	Ohau ..	416	94.165
Cheltenham Co-op. ..	3	Pakeha ..	1684	94.105
Shannon Co-op. ..	1489	Shannon ..	1204	94.055
Kia Ora Co-op. ..	926	Kia Ora ..	1234	94.040
Arahura Co-op. ..	1516	Arahura ..	54	94.033
Rongotea Co-op. ..	8	Rongotea ..	813	94.021

Company or Proprietor.	Reg. No.	Brand.	Tonnage graded.	Ave. Grade.
Cheese.				
Omimi Co-op. ..	74	Omimi ..	58	93.483
Kaimata Co-op. ..	992	The Oaks ..	401	93.440
Stratford Co-op. ..	219	Huinga ..	308	93.125
Kaitangata Co-op. ..	1618	Kaitangata ..	68	93.073
Rai Valley Co-op. ..	519	Rai Valley ..	320	93.035



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Factors in Successful Farming.

(8) Live-stock Replacement and Improvement.

W. N. PATON, Senior Investigational Officer, Accounts Division.

AS previously stressed, the bulk of New Zealand farming concerns the production of live-stock products. Hence, the quality of live-stock as efficient producers is of vital importance in our case. Undoubtedly progress is being made in the better care and management of stock, and also in live-stock improvement, but, in view of the high annual replacement obtaining in herds and flocks in more recent years, it would seem that the progress referred to is being offset in part at least by the effects of disease and wastage, attributable mainly to various high-level-production methods not being accompanied in sufficient degree by the necessary safeguards. It may be granted that replacement in productive and/or reproductive stock is unavoidable even under the best conditions and management, but this is no admission that some of it cannot be avoided.

Keeping Down Replacement.

By what general methods can live-stock replacement be kept down to a reasonable minimum? It will be noticed that the phrase "reasonable minimum" has been used. This is because of the fact that the law of diminishing returns begins to operate at some stage in the process of reducing replacement to lower and yet lower levels, until a point is reached beyond which further efforts are rendered uneconomic. Neither should farmers who are aware of this err in the other direction, nor should those not previously aware of the point use it as an excuse for lack of the necessary effort.

Avoidable replacement can be kept down by (1) employing stock in the first place that are of good constitution, clean, and sound; (2) seeing that an adequacy of high quality and palatable feed of sufficient variety is provided at all times (with enough margin for possible adverse conditions) as an assurance against under-nourishment and malnutrition; (3) giving special attention to dams and offspring during the more critical ante-natal and post-natal periods, to all ailments without delay, and seeing that precautionary stock hygiene is not neglected; (4) treating all stock kindly and providing adequate, clean drinking-water, rugging, shelter, licks and concentrates, &c., as necessary under prevailing conditions; (5) culling regularly and/or segregating for disease of a contagious nature or for disease that

cannot be readily controlled; and (6) culling low-productive, unthrifty, poor-constitutioned, shy-breeding, poor-mothering stock, &c.

Where replacement stock is purchased the farmer should comply with the conditions of point (1). In general, stock of good constitution and state of health can be purchased fairly readily, but when it is desired to combine these features with that of high productive capacity and worth the object is less easily achieved. Therefore, there is a sound argument in favour of raising one's own replacement stock.

Some maintain that this practice is uneconomic on the grounds that replacement stock can be bought as cheaply as, or more cheaply than, raising them one-

self. Where local conditions are not sufficiently favourable to the proper raising of young stock this contention may be quite sound, but, on the whole, the contrary proves the better course to follow in the long-run. Where it is desired progressively to raise the quality of the productive stock—and this should be the aim in all live-stock farming—it is better to rely on one's own efforts than those of others. Moreover, the work is self-educative in more ways than one, and tends to keep down disease and wastage.

Improvement Work.

Broadly, the principal portions into which live-stock improvement work may be divided are (1) breed and degree of purity (*i.e.*, crossbreds, grades, or pure-breds), (2) strain aimed for (embodying



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type conformation, productive and/or reproductive aspects and constitution), (3) breeding and raising young stock, and (4) culling to obtain and maintain the standard set. Many appear to consider these things too difficult and precarious, but for those anxious to make good progress it is a job not to be shirked. There may be a good deal to learn from books and experience in this class of work, but this should be looked upon as being an inseparable part of successful live-stock farming.

The work leads to a better understanding and control of stock matters, and as live-stock serve as indicators of the effects of farm working and management on soil, pasture, forage crop, and other aspects, farming problems in general are rendered clearer and more fully appreciated. By facing up to the improvement side of live-stock work a farmer is likely to become more skilled and efficient at his vocation in general.

How to Proceed.

With the facilities available in these days reasonable progress in live-stock improvement is within the ability of the average farmer. Moreover, the job can be considerably simplified by starting right and following a definite system. Such a system is as follows: Start with the best stock that the pocket will allow. Endeavour to have all female breeding-stock as uniform as possible not only at the start, but also throughout the whole improvement programme. By this is meant that they should conform to a common type in conformation, size, breed, &c. It is a distinct advantage in this respect if foundation stock can be secured from a vendor who has been maintaining a given type from common sires for several generations.

Where there is a lack of sufficient uniformity in the dams the progeny by a given sire will also prove too variable, unless the sire happens to be definitely prepotent, which admirable quality is but rarely obtained except occasionally in stock from master breeders. All sires used should be of considerably higher standard than the dams and be backed for several generations by sound, high-productive stock. Sires selected should be good representatives of the type aimed for, and, if possible, line-bred to a given strain.

As like produces like, the progeny from a uniform group of breeding females mated to a common sire are more likely to be uniform also. Because sires are the lesser numerically, the use of high-quality sires in such a way enables rapid progress to be made in a simple and cheap manner. Improvement based on this system is mainly dependent on the sire. After considerable progress has been made along these lines further progress may

only be possible by giving more consideration to the female side, but at such a stage one is verging on the position of the stud-breeder, whose case, naturally, is outside the scope of this article.

Improvement Culling.

In the course of a live-stock improvement programme it is necessary to cull out those animals which fall below the average standard in regard to conformation type, productive-capacity, constitution, fecundity, &c. This culling is in a different category from that referred to under wastage and disease. Both classes of culling, of course, must be carried out. Carried far enough, improvement work eventually leads to the establishment of strains, at which point uniformity for a given type is becoming fixed in the blood lines, and hence tends to be hereditary.

Measures and Aids.

As in other aspects of successful farming, measures and aids need to be employed in order to get closely to grips with

the problems involved and thus avoid too much dependence on appraisal and judgment. Well-known examples of various live-stock measures and aids are herd-testing, calf-marking, pig recording, pig grading and measurement of back-fat, laying competitions and trap-nest testing of fowls, microscope and benzol tests for hairy fibres in wool, wool counts, dressed meat competitions, sire progeny tests, live-stock shows, &c.

Increased interest in recent years in such matters is in evidence in most branches of live-stock farming. Moreover, should sufficient support be forthcoming, there is scope for further measures of the types mentioned being introduced. It is through the employment of modern tools such as these that rapid progress in high-level live-stock production is rendered possible. It therefore behoves all live-stock farmers to adopt all facilities and aids available in order to obtain the best results possible. Next month's article will deal further with aids and measures in live-stock farming.

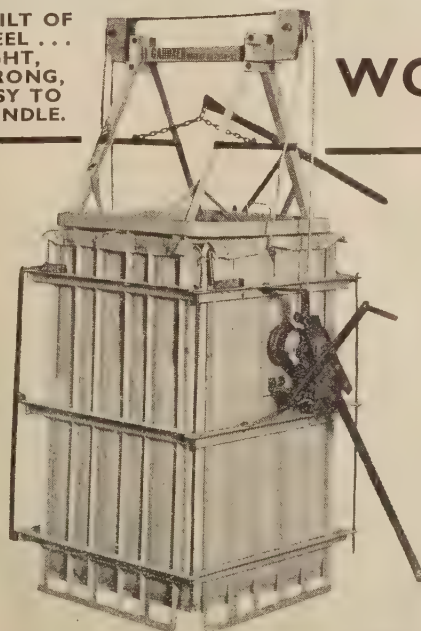
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578,666 New Zealanders Can't be wrong!

When the vast majority of grown-up New Zealanders are of one mind on a subject, such a degree of unanimity indicates a deep-rooted conviction. At the last Election 578,666 electors gave an overwhelming verdict against prohibition, for the following reasons:

1. New Zealand must vote against prohibition which has so thoroughly demonstrated its calamitous results. It can no longer be regarded as a serious issue.
2. New Zealand cannot afford to squander millions to provide additional proof of an acknowledged universal failure.
3. Under Continuance the licensed trade contributes very substantially to the revenue and creates legitimate employment for thousands.
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5. America gave prohibition a thorough trial, lasting fourteen years and costing billions of dollars. Repeal was carried by the biggest majority ever recorded on any question.
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VOTE CONTINUANCE

Farm Practice and Management.

Contributed by Officers of the Fields Division.

Speeding Up Top-dressing.

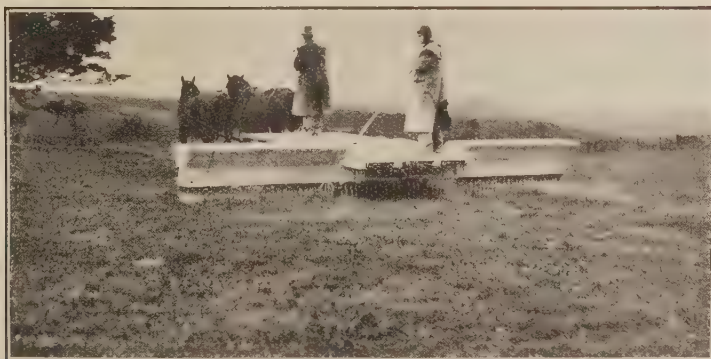


Fig. 1.—The implement in action as a broadcasting-machine. Fertilizer, such as lime and superphosphate, is mixed on the lorry platform and fed into the distributing-box by the man standing on the back of the implement.

TOP-DRESSING is recognized as the keynote of success, although its means of application are many and varied. Some methods are laborious, and others more simple, much, of course, depending on the contour of the country. Of the many methods used, the one resorted to by an enterprising farmer in

the Waimate North district appealed to me as being both original and labour-saving.

The implement he has evolved follows the lines of the usual manure-distributor, but his implement considerably minimizes the time and labour required. As can be seen by the accompanying illustrations,

an old motor-car chassis complete with wheels has been requisitioned. The differential and tail-shaft were left intact to provide the drive for the distributor-box (Fig. 3). To transmit this drive a shaft has been fitted directly over the tail-shaft and coupled to it by two pinions which can be thrown in and out of

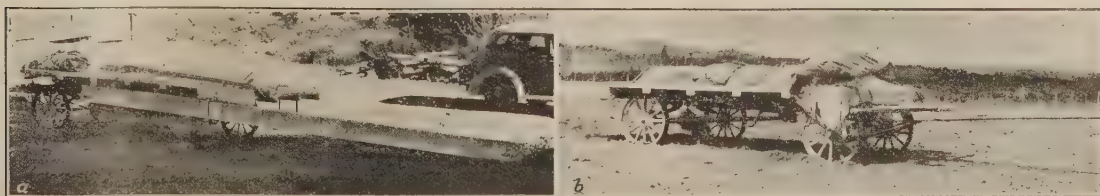


Fig. 2.—(a) The method of taking the implement through gateways. The sides of box (sections lying on platform) are lifted from their sockets and the box is turned to one side of implement by the provision of a swivel attachment on the left-side box-holder; (b) the motor-car chassis converted into a combined lorry and top-dresser. The illustration shows the implement in use as a lorry.

mesh. The top shaft takes the drive back to a crank actuating a light, square-linked, binder chain which runs the full length of the distributor-box.

When the implement is drawn forward the drive from the rear wheels via the differential, tail-shaft, and return shaft is transmitted to the crank, which draws the chain forward at each revolution, the chain being returned by a strong spring. This gives it a to-and-fro motion in the bottom of the box, to which an adjustable slot is fitted to control the various quantities required per acre.

To eliminate as much as possible the top-dressing being blown away a strip of sacking reaching almost to the ground has been fitted in front of the box. The height of the implement has been kept as low as possible by fitting 6 in. iron tires to the wheels in place of the usual rubber tires. The draught is provided by two horses yoked to a centre pole, which has been fitted in such a manner that the front wheels function as they do on an ordinary wagon.

For shifting the implement from one paddock to another the box can be quickly swivelled to allow clearance through gateways (Fig. 2 (a)).

This implement spreads fertilizer very evenly (Fig. 1), and its chief virtue is the facts that it has a 20 ft. spread capable of top-dressing approximately 7 acres an

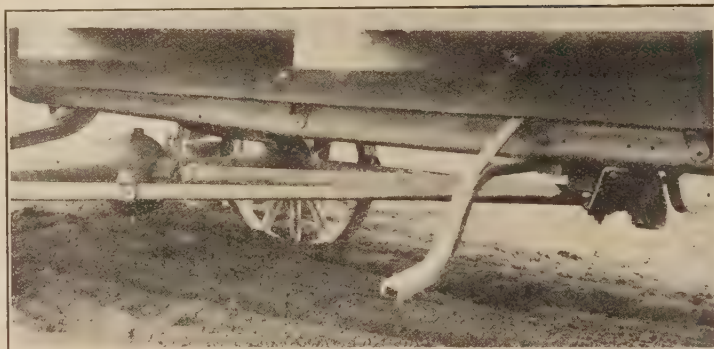


Fig. 3.—A view showing the original tail-shaft with the pinion attached to provide the drive for the distributor-box.

hour, and the fact that the box can be easily detached and the implement then used as an ordinary farm wagon (Fig. 2 (b)).

All the work in constructing this ingenious implement was carried out by the farmer himself, and it greatly assists him to apply his top-dressing expeditiously and serves as a useful lorry for carting out hay and ensilage to his stock during the winter months.

—E. B. Glanville, Instructor in Agriculture, Whangarei.

Dodder-infested Lucerne.

Some four or five years ago a farmer in North Canterbury cleaned up a small paddock of lucerne badly infested with dodder by spreading a light covering of straw over it in autumn and burning off against the prevailing wind. Burning off in this way cleaned out the dodder completely, and it has not reappeared on any part of the paddock. The stand, which is over sixteen years old, is still quite a good one.

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Winter Feed in Southland.

BECAUSE of the vagaries of the climate the position regarding winter feed for stock in Southland has been for the past two seasons most unsatisfactory, and in general the quantity available has been insufficient to permit of stock having a liberal daily ration.

During the 1936-37 season, which will be remembered as one of the wettest on record, the weather at harvest-time was such that crops in many instances rotted in the paddock, and those that were harvested were gathered under such conditions that they were most inferior in both quantity and quality. Turnip crops were, for the most part, poor, as it was impossible because of the wet conditions to do any of the necessary inter-cultivation work, and the prevailing climatic conditions increased the incidence of the many diseases to which these crops are prone.

Surplus Feed for Hay.

Fortunately, before the weather broke in December, 1936, there was a considerable "rush of pasture growth," and many farmers took advantage of this to make into hay as much as possible of this surplus feed. It was this fortuitous circumstance that enabled many to face the following winter with a certain amount of confidence in spite of the shortage of roots.

The past season, 1937-38, was as dry as the previous season was wet. Conditions were ideal for harvest, but, unfortunately, there was no surplus grass for haymaking, and turnip crops were practically a failure because of the continuous dry weather and the extensive damage done by "blight." The result of this definite shortage of winter keep is that quantities of dry feed have been imported from other more fortunate districts, and Southland farmers have been forced to winter their stock on a minimum of roots.

Lesson of Past Seasons.

The lesson of the past two abnormal seasons should be borne well in mind, and everything should be done to ensure that full advantage is taken of converting any flush of pasture growth into hay. In this connection it would be most advisable to top-dress the best pastures with ammoniated superphosphate during this month—3 cwt. per acre is suggested so that the paddocks will produce a good heavy crop.

It is realized, of course, that no one can control climatic conditions, but, with average weather, there will be the satisfaction of having done everything possible to assist in making provision for feed for stock during the coming winter.

Following last season's early harvest, there was considerable activity in catch cropping with oats, black skinless barley, or rye-corn, and it is suggested that this matter should be given consideration again this season.



Fig. 1.—Top left: Showing the method of attaching the five wires to the anchor posts. Wire strainers are used for the wires. Top right: Driving in the short supports. Two wires are stapled to the long stakes to prevent the sheep jumping into the feeder. Bottom left: A wire is threaded through the sacks to prevent sheep pushing underneath and wasting chaff, and it also holds the sacks down in windy weather. Bottom right: The completed feeder.

Use of Feeders.

The most popular method of winter feeding has been with chaff fed out in feeders. This, with a limited quantity of turnips, has proved most satisfactory. In some instances, however, farmers threshed and sold oats, only to find later that they would have been in a much better position for stock feed had they not done so. The feeders mentioned above have already been described in a previous issue of the *Journal*, but the illustrations convey a better idea of the method of erection.

—W. Faithful, *Fields Instructor, Gore.*



Fig. 2.—The feeder in use.

Manuring of Turnips in Canterbury.

IN the foothill country of Canterbury good crops of soft turnips are still grown as winter feed for sheep in spite of all that is said of the ravages of diamond-back moth and white butterfly. Superphosphate is used with every crop, as it has been found to be absolutely necessary, but there is considerable variation in the methods of sowing and the quantities of manure used.

Numerous experiments have been carried out in the past, but the recommendations derived from the results have not been fully adopted by the farming community. Without going into details of these trials, one could make some pointed comments on the methods adopted by many farmers. Seed should be drilled through every coulter, rather than in every other row. Even though smaller bulbs are produced, the total yield of sheep food is greater. Many still sow turnips in 14 in. rows.

Use of Superphosphate.

With regard to the use of superphosphate, the problem is to apply sufficient quick-acting manure close to the seed and yet avoid germination injury. Superphosphate is water soluble, and under the dry-soil conditions that prevail at sowing-time even small quantities are liable to cause germination injury. One hundredweight per acre sown in 7 in. drills has only a small effect, but the use of larger quantities is not safe. One hundredweight per acre sown in 14 in. drills means double the concentration of fertilizer, and is practically certain to cause a patchy crop.



Left: 1 cwt. superphosphate with the seed, cross-drilled one month later with another hundredweight—yield, 16 tons per acre. Right: 1 cwt. of superphosphate sown with the seed—yield, 13.5 tons per acre.

Some farmers sow turnips through every coulter with 1 cwt. of superphosphate, and then apply another dressing of 1 cwt. per acre when the plants are 3 in. to 4 in. high. The initial application promotes rapid growth at the start, and the latter dressing helps to extend the growing period of the crop. This is quite a common practice in some districts, but when looked at from the financial side it will be seen to have its drawbacks.

The crop in the accompanying photograph was all sown with 1 cwt. of superphosphate to the acre, and about three-quarters of the paddock was cross-drilled one month later with another hundredweight. The response to the second hundredweight was most marked; so plain, indeed, that it was possible to trace out each coulter where the last of the manure ran out of the drill.

Comparison of Weights.

Weights were taken to determine the difference in yield. Two applications, each of 1 cwt. of superphosphate, yielded 16 tons per acre, and one application yielded 13.5 tons per acre, the difference being 2.5 tons. Estimating superphosphate at 4s. per hundredweight, cartage at 1s., and drilling at 2s. 6d. per acre, the total cost of the extra manuring is 7s. 6d. per acre. Valuing turnips on a basis of 4d. per sheep per week, they are worth about 3s. per ton over an average feeding-time of nine weeks. Hence, the value of an increase of $2\frac{1}{2}$ tons is 7s. 6d., leaving no profit on the undertaking.

In spite of these figures, the practice has a certain amount to support it, as the second application may in some seasons determine whether the crop is a success or an utter failure. The cross-drilling drags out very few plants, and the cultivation on the top soil must be beneficial.

Equal Quantities Advocated.

For years the Department has advocated the use of equal quantities of lime and

superphosphate well mixed, and this mixture, drilled in with the seed at the rate of from 2 cwt. to 4 cwt. per acre (provided, of course, that the two have been properly mixed four or five days before sowing), undoubtedly gives the best results, but the laborious task of mixing the lime and superphosphate and turning it after it has set in the heap deters people from the practice. After one experience they are usually content to mix the lime bag for bag into the drill with the superphosphate.

It may aid the superphosphate to run, but such a small quantity of lime can have only a minute influence on soils that require an application of 1 ton to the acre. As the superphosphate and lime have not had a chance to interact chemically there cannot be much effect in preventing germination injury.

What the farmers need is a reverted phosphate made up ready to sow, and an attempt to meet this demand has been made by the fertilizer companies. Reverted phosphate has been on the

market for the last two or three years, and has been tested out in a number of trials during the last two years.

Injury Caused.

Compared with the superphosphate-lime mixture, commercial reverted superphosphate is unfortunately causing injury to the extent of 25 per cent. to 30 per cent. when crops are grown under the same conditions, both mixtures supplying the same amount of phosphoric acid.

Some may argue that it is better to sow a few more ounces of turnip seed with reverted superphosphate to compensate for the decreased germination than to trouble to mix the lime and superphosphate. Germination injury results in a patchy crop, and increased seeding does not seem to be a remedy.

Summing up, the best results are obtained from sowing 8 oz. to 10 oz. of seed through every coulter and using 4 cwt. per acre of the mixture, 2 cwt. of superphosphate and 2 cwt. of carbonate of lime.

—A. S. Nash, Instructor in Agriculture, Rangiora.

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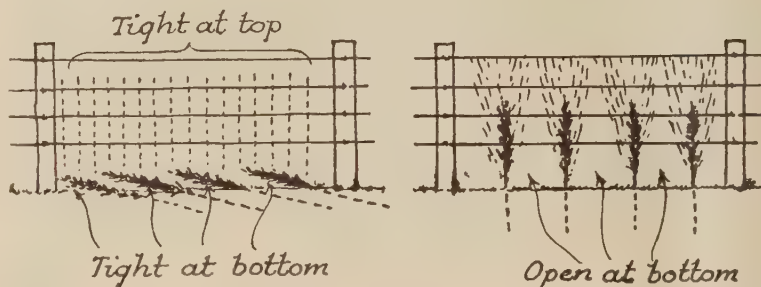
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Planting a Hedge.

REFERENCE was made in an article on "Farm Shelter and Shade" appearing in the July issue of the *Journal* to a method of hedge establishment by the planting of cuttings alongside fence-lines, and it was stated that an incline of about 60 degrees from the vertical position was desirable when inserting in the soil most kinds of hedge cuttings, as this practice not only conserved the relatively small supply of sap for the longest possible period, but it also, as a general rule, produced a denser hedge.

In illustration of the latter point the accompanying diagram is helpful in making clear how denseness is increased, particularly at the bottom, as a result of inclined planting of cuttings. The dotted lines represent shoots issuing from buds associated with each cutting. The left-hand illustration depicts an unbroken line of vertical growths resulting from 2 in. or 3 in. of above-ground overlap, while the right-hand diagram illustrates the bottom openness of a hedge grown



with vertically planted cuttings actually spaced the same distance apart as those shown planted on the incline.

In some instances farmers are prompted to plant a double-row of cuttings with the idea that they will get a better hedge. Actually, this practice is, in the majority of cases, not only wholly unnecessary, but it also represents a waste of perfectly good cuttings, and later produces a hedge with a breadth which is always an embarrassment to the owner. Possibly the

only hedge plant that can claim to produce a better hedge when planted in double rows is the *Eleagnus japonica*, and this is due to its lack of stability in single rows when planted in a windy situation.

Generally speaking, therefore, carefully planted and well cared for single-row hedges capable of establishment from cuttings are all that are required on the average farm.

— C. R. Taylor, *Fields Instructor, Whakatane.*

Potato-growing in Marlborough.

THE opinion has sometimes been expressed that potato-growing in Marlborough is not a very profitable venture, due to the climate or some other such obscure factor causing lines of seed potatoes to run out rapidly. Further, there is a fairly persistent idea in the district itself that Marlborough seed is necessarily inferior to that from other provinces.

One has only to consider the history of potato-growing in the district to realize how these misconceptions came about, and a glance at recent activities will show how incorrect they are to-day. About thirty years ago potato-growing was a much bigger activity than it is at present, and one hears that potato-pits of considerable size were to be seen on every other farm. At that time the most popular variety was known as "Brown River," and on practically virgin land with virus-free seed some astonishing yields were obtained.

Artificial manure was hardly ever used. One yield of 27 tons to the acre showed

what could be done under the above conditions. A considerable export of potatoes was then usual, and many of the Marlborough-grown tubers found favour overseas. This period was what might be called the heyday of the industry in the district.

After a few years of high production, however, the seed stocks, for no apparent

reason, began to deteriorate. This was a gradual process at first, but it later became very rapid, until practically all the lines were what was termed "run out." Consequently, year by year, the yields diminished, until 3 tons to 4 tons per acre came to be the accepted crop, and many farmers turned to more profitable lines.

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New lines were introduced, but it was only a matter of a few years before these, too, were reduced to the condition of the older lines. It is from this "depression" in the industry that the erroneous ideas formulated earlier have arisen and persisted.

Spread of Disease.

In the light of more recent knowledge there seems little doubt that the "running out" was due to the existence and spread in the seed stocks of potato-virus diseases. These diseases were then not recognized, and no roguing was practised. This, coupled with the practice of planting the small seed (about 2 oz.) which, as is now well known, is more likely to be virus-infected, soon enabled the disease to spread throughout the district.

New lines which were brought in showed up well for the first year or so, but again measures were not taken for the prevention of virus diseases, with the result that inroads were soon made on these lines also. The writer has observed lines of the older seed where practically the whole crop has been heavily infected. One crop of $\frac{1}{2}$ acre extent was particularly outstanding in this respect; out of the whole area only one completely virus-free plant was found. The yield, of course, was negligible.

Recovery of Industry.

It was not until recent years that research into the nature and spread of potato-virus disease began to bear fruit. When the results of this work were put into practice they proved as eminently successful in Marlborough as in other districts. New lines were introduced, and these were watched for signs of virus disease, heavy roguing then being practised. Areas which were considered to be "isolated" as regards aphid activity were selected, and crops were grown there under the certification scheme.

With an understanding of the disease and consequent roguing at the correct time, the quality of Marlborough seed potatoes has risen rapidly, so that now several lines of mother-seed potatoes have been produced in the district, while there is at least one line which comes into the mother-seed group, the highest quality provided for under the certification scheme.

Results of Certification.

The yields of potatoes have risen correspondingly with the advance of certification and the consequent "cleaning up" of the seed stocks. The experience of one farmer who tested out the certified or virus-free seed against the older lines might be quoted. On similar land and with identical treatment 4 tons per acre were secured, as against 11.6 tons with certified seed, while in the following season

the uncertified seed yielded approximately $3\frac{1}{2}$ tons per acre, in contrast with the yield of 12 tons from the good seed. This experience has been duplicated practically all over the district.

Thus it can be seen that through the agency of certification potato yields have been raised to something approximating the level formerly attained. It must be remembered, of course, that much of the land is no longer in its virgin state; in fact, in many cases extensive cropping has taken place in the interim.

It is now necessary to consider much more than the type or seed if a good crop

is to be expected, and farmers recognize this when manuring and thorough cultivation are practised. However, the idea that Marlborough seed-potatoes are inferior to those from other districts can be definitely refuted, and farmers can sow this seed with confidence, provided, of course, it has passed the certification regulations.

The Crop this Year.

The time of planting was irregular this year because of fear of late frosts, and some crops were not sown until very late. Unfortunately, this sowing was coincident with a very dry spell, and practically all

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the seed sown at this time received a check in the early stages of growth, yields being thus depressed. Earlier-sown crops were more fortunate, and were able to tide over the dry spell and produce good yields. Many crops of more than 12 tons per acre have been noted, while the incidence of late blight has been very slight.

One recently-dug crop, which was rather interesting in that it displayed the effect of "isolation" in keeping virus in check, came from the well-known Molesworth Station. This crop of Dakotas was self-sown, and although it has not been cared for it yielded an excellent crop of large tubers which were evidently virus-free. Without doubt the

distance from cropped areas and the lack of aphid infestation has done much to keep this crop free from disease.

The season this year has, on the whole, been fair as regards potatoes, and the superiority of certified seed has again been well demonstrated.

—D. R. Wilkie, Instructor in Agriculture, Blenheim.

Pasture Establishment on Light Soils.

IN the June issue of the *Journal*, on page 453, a short note was given on "Good and Poor Ploughing on Light Soils." The resultant established pastures on light soils following the two classes of ploughing always show great differences, although similar seed-mixtures may be used and similar manurial treatment given. When the cultivation is also not up to the standard there is a greater outstanding difference, giving the observer the impression that he is viewing good and poor land.

Pasture after Poor Ploughing.

Figure 1 shows a typical young pasture sown after poor ploughing and inadequate cultivation and consolidation. The pasture is a decidedly weak and open sward—stunted perennial rye-grass, cocksfoot, crested dogtail, white clover, timothy, Yorkshire fog, moss, rib-grass, catsear, and self-heal. Following the poor ploughing, the work of cultivation and consolidation always entails extra labour, and even with this satisfactory results are not obtained. The surface is uneven, and much seed is lost by falling in the many open spaces and thus being buried too deeply or not at all. For this reason and because of lack of proper consolidation the pasture is slow to establish, and a reasonable ground cover of the grasses and clovers sown is not obtained, thus leaving great scope and opportunities for invasion of inferior grasses, such as Yorkshire fog and sweet vernal, and weeds.

Figure 2 shows a typical young pasture established on identical soil conditions, but following thorough ploughing and cultivation and consolidation, with much less time spent in securing the necessary good seed-bed. A more rapid pasture establishment with excellent density of sward is secured, thus providing good ground cover with the minimum of opportunity for the invasion of inferior grasses and weeds. The pasture is representative of the seed-mixture sown—dominant rye-grass, sub-dominant in white clover and cocksfoot.

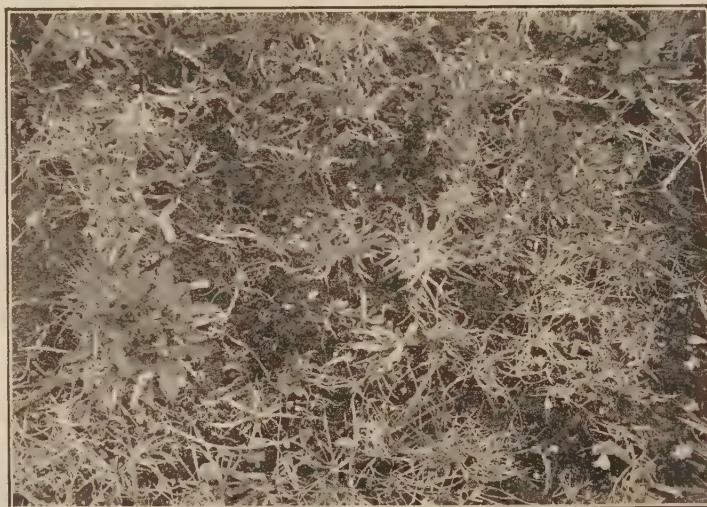


Fig. 1.—A typical young pasture sown after poor ploughing and inadequate cultivation and consolidation.



Fig. 2.—A typical young pasture established on identical soil conditions as Fig. 1, but following thorough ploughing, cultivation, and consolidation.

Wait of Three Years.

In the first instance the farmer has to wait three years before he secures a reasonable ground cover, and then he has only secured a pasture which carries a high percentage of inferior grasses and weeds. Consequently it is low in carrying-capacity and production, although the expenditure in time, labour, and fertilizers for establishment and maintenance is equal to that required for good pasture.

At the end of three years from time of sowing, pastures developed from a foundation as in Fig. 1 will have a carrying-capacity of only one dairy cow to $2\frac{1}{2}$ acres or $2\frac{1}{2}$ acres. On the other hand, following the methods of thorough and proper ploughing, cultivation, and consolidation, the carrying-capacity will be one dairy cow to $1\frac{1}{2}$ acres or $1\frac{1}{2}$ acres, and good production will be obtained in butterfat returns or beef-production if the land is stocked with beef cattle.

Although the amount of fertilizers applied per acre is the same for both types of pasture (the usual application being 3 cwt. per acre), the poorer type with less production takes a greater amount of fertilizer for the maintenance of the dairy cow and the production of a given quantity of butterfat than is the case with a similar amount of fertilizer per acre applied to the good, established pasture.

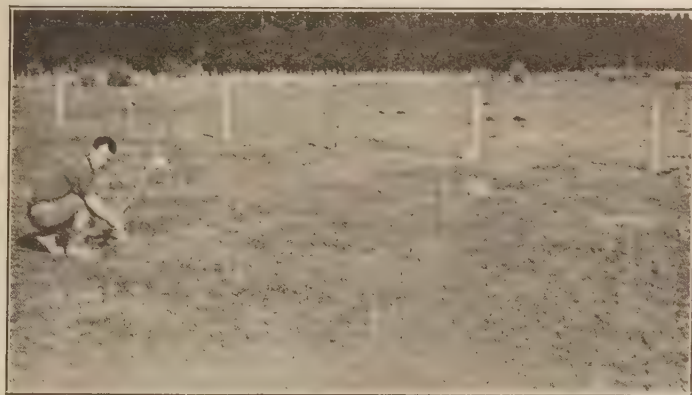
—C. S. Dalgliesh, Instructor in Agriculture, Rotorua.

How to Lay Out a Right Angle.

NOT infrequently the farmer, in laying out his fence-lines, requires to subdivide with a fence at right angles to an existing line. Few farmers possess an angle-measuring instrument for this purpose, but the job may be done easily and accurately by the following means:—

With a tape measure lay off along the existing fence-line four units of length (links, feet, or yards) from the point where the subdivision is required. This may be done either to the right or left from the point of subdivision. From the same point measure a piece of cord three units in length in the direction in which the subdivision is to be made.

Now from the point measured four units along the existing fence-line, measure off five units with the tape in the direction of the cord. Where the cord three units in length bisects the tape at five units is the point through which the new fence line must pass to be at right angles to the original.



The method of laying out a right-angle for fencing. The two measuring-cords can be seen bisecting.

In practice the longer the sides of the triangle, the more accurate will be the right angle. The sides may be 30 ft., 40 ft., or 50 ft.—in fact, any convenient

multiple of the original three, four, or five units.

—D. M. E. Merry, Instructor in Agriculture, Nelson.

Feeding Pressed Hay.

THE accompanying photograph illustrates a useful idea in the feeding of baled hay to sheep. The baling wires are not removed, and the bale is stood on end, being kept in this position by four stakes driven into the ground.

By this means, waste is avoided to a great extent and damage to the pastures is minimized, as a fresh site can be selected for the next bale. In this manner hay can be easily fed to sheep when actually on a "break" of turnips, and the ration can be balanced by the animal.

—A. Stuart, Instructor in Agriculture, Invercargill.



Horticultural Instruction.

Contributed by Officers of the Horticulture Division.

Orchard Notes.

Spraying and Grafting.

DURING September the first sprays in the general spray schedule became due, and already in some districts on at least some classes of fruit the first or "foundation" sprays will have been applied. The main factors in the successful control of disease by spraying, as well as recommendations for the first sprays, were discussed in last month's notes.

A general programme cannot readily be set out according to dates, as considerable variation exists between districts and even in different varieties in the same district, so that it has become customary to accept as a guide definite stages in the development of bud, blossom, and fruit in timing spray applications.

A complete spray schedule for the control of the principal pests and diseases of the different kinds of fruit is set out below, but may require some slight modification to meet special circumstances. Recommendations in connection with the use of lime-sulphur refer to commercial brands containing 15 per cent. polysulphides, which is practically standard.

Apples.

1. *Green-tip Period.*—Bordeaux mixture, 5-4-50; lime-sulphur, 1-30.

2. *Open-cluster to the Pink Period.*—Lime-sulphur, 1-150, plus colloidal sulphur 2 lb. to 100 gallons of the mixture.

NOTE.—It is an advantage to weaken the lime-sulphur to summer strength at this stage, and supplement with colloidal sulphur to reduce russetting. The alternative is to use lime-sulphur 1-75.



Fig. 1.—(a) A fully refurbished tree (Granny Smith on Statesman three years from grafting); (b) a portion of a tree with the leaders reduced in height and the lower framework refurbished (Granny Smith on Statesman two years from grafting).

3. *Petal-fall Period.*—Lime-sulphur 1-150, plus colloidal sulphur 2 lb. to 100 gallons, plus lead arsenate $1\frac{1}{2}$ lb. to 100 gallons, plus hydrated lime 3 lb. to 100 gallons.

4. *Ten to Twelve Days later.*—Repeat No. 3.

5. *Seventeen-day Intervals up to Mid-December.*—Lime-sulphur 1-180, plus colloidal sulphur 2-100, plus lead arsenate $1\frac{1}{2}$ -100, plus hydrated lime 3-100.

6. *Subsequently at Fourteen to Twenty-one-day Intervals until End of January and later as required on later Varieties.*—Lime-sulphur, 1-200, plus other ingredients as in No. 5.

Control of Pests.

Apple leaf-hopper may be combated by adding to any of the foregoing sprays nicotine sulphate 1-800 and applying the spray when the nymphs appear. This pest usually appears in January, but in some districts under dry and warm seasonal conditions may appear by the end of October. A close observation on foliage is therefore required early in the season.

During January and February red mite may cause appreciable injury, but may be controlled by the use of summer-oil 1-100. This spray will also control apple leaf-hopper, if present as nymphs.

Two applications ten days apart will give complete control of red mite. This spray should not be applied within ten to twelve days of any sulphur spray. Red mite may appear in appreciable numbers much earlier than January. It is not practicable to apply a summer-oil earlier without interfering with the programme, for the control of black spot and powdery mildew. It has been found from experience, however, that the combination of lime-sulphur and colloidal sulphur will give a measure of control which is not obtainable by either material alone, and that, by using the combination, a devastating attack of red mite may be delayed until later, when an application of summer-oil is practicable.

Where black spot and powdery mildew have been very prevalent a more intensive spraying programme may be required in the earlier part of the season to control effectively these diseases. No. 2 spray, if applied at open cluster, may be repeated when 25 per cent. of the petals are open. The alternative spray is not available then.

Pears.

1. *Green-tip Period.*—Bordeaux mixture 5-4-50.

2. *Pink Period.*—Bordeaux mixture 3-4-50.

3. *Petal-fall Period.*—Bordeaux mixture 3-4-50, plus lead arsenate 1½ lb. to 100 gallons.

4. *Later at Intervals.*—Spray as for apples.

Certain pear varieties will not tolerate so much Bordeaux mixture, but will produce a smoother skinned pear if sprayed as follows:—

1. *Green-tip.*—Bordeaux mixture 5-4-50.

2. *Pink Period.*—Lime sulphur 1-75.

3. *Petal-fall and subsequently.*—Spray as for apples.

This programme suits the Winter Cole and P. Barry varieties. Josephines will not tolerate Bordeaux mixture at any stage later than green tip, and it is advisable to substitute lime-sulphur 1-30 as a foundation spray.

Stone-fruits.

1. *Bud-movement Period.*—Bordeaux mixture 5-4-50.

2. *Pink Period.*—Lime-sulphur 1-150, plus colloidal sulphur 2 lb.-100 gallons.

3. *Petal-fall Period and at Intervals.*—Lime-sulphur 1-200, plus colloidal sulphur 2 lb. to 100 gallons.

No. 2 spray is important in the control of brown-rot by preventing infection in the blossom stage. This and subsequent applications prevent leaf-rust and shot-hole.



Fig. 2.—A row of Granny Smith on Statesman two years from grafting. The leaders are reduced to half the original height and top-worked, and the lower framework is refurnished.

Soil Treatment.

Land should be brought into good tilth as early in the spring as practicable, both for the purpose of conserving moisture and for bringing about an improved physical condition which will stimulate root-activity. In districts where dry conditions frequently prevail in the spring and early summer failure to secure a good tilth by the end of September is often reflected in foliage immediately the trees come into leaf, and spray injury under such conditions is not uncommon. All efforts should be made to prevent the land from drying out and becoming hard and cracked on the surface before attempting to work it to a fine state.

Certain districts, notably Hawke's Bay, have experienced an abnormally wet autumn and winter, and the usual ploughing and fallowing has not been possible. The flat lands have remained sodden, and will be more difficult to handle in the spring. Following the spring ploughing, a dressing of carbonate of lime, 1 ton to the acre is advisable. Disking and harrowing should follow fairly soon after the spring ploughing.

Grafting.

Unsuitable varieties may be changed by grafting. This work should begin as soon as growth begins and the bark will lift freely. It is possible to begin by mid-September, and the work may be continued well through October so long as the scions are kept in good, fresh condition and have not made appreciable movement.

In reworking to other varieties of grafting, as in planting, it is important to select varieties to satisfy the consuming

public or what the public are likely to require. The choice should be made with a view to giving a good distribution of labour through the harvesting season, while avoiding, as far as possible, having too many small lines.

The older procedure generally employed in reworking is to cut back the main limbs to short stumps and insert grafts in the ends. Where the trees are full-grown and the stumps are thick the "bark" or "rind" grafting method is employed, but in younger and much smaller trees the "whip" graft method may be used.

Older Procedure.

In the former case, which is the most common, in reworking, a vertical slit is made in the bark at the end of the stumps and the bark is raised on one side of the slit. The scion, which should be about 4 in. long, is prepared by making a long slanting cut of about 1½ in. at one end. The scion should then have a thin strip spliced off one side of the cut to meet the unraised bark. It is then slipped under the lifted bark and pressed down firmly into position. A tack may be driven through the raised bark and scion into the stock to keep the scion firmly in place. The union must be well sealed with grafting-wax or some proprietary grafting compound of good repute.

More recently consideration has been given to the idea of "refurnishing" mature trees of good framework in changing the variety—an alternative to deheading and grafting on to stumps of the cut-back main limbs. The main advantage is the substantial saving of time in bringing a tree back into full production, although the work is more laborious and means a greater initial expense because

of the number of scions inserted. Actually only one season, or at the most two, are lost before refurbished trees are producing, whereas by the older method a new framework has to be formed, which normally takes up to five and six years.

"Refurnishing" the Trees.

Scions are introduced along the whole length of the main limbs. Branches not required are cut out, and the remaining ones are made bare, shortened slightly, and side laterals suitably placed for grafting are cut back to stubs. Grafts are inserted at regular intervals, using the laterals suitably placed. Grafts are also inserted in the tops of the shortened leaders. If laterals are insufficient and not suitably placed additional scions may be inserted into the bark. This is done by the inverted L method, which is similar to "rind" grafting. Another method is to make two converging cuts $1\frac{1}{2}$ in. in length and of a width to take the scion neatly. The strip of bark between is raised from the wider end and the scion inserted.

A portion of the tongue of bark thus raised is cut off, and the end of the scion is firmly held under the unraised bark. The scion then requires tacking in to hold it firmly to the stock, and it is sealed in the ordinary way. Scions are prepared as



Fig. 3.—(a) Rome Beauty on Gravenstein one year from grafting; (b) Kidds Orange on Dougherty two years from grafting, partly pruned.

for "rind" grafting, except that both edges of the cut have a thin strip pared off.

Between the two extremes of deheading for grafting and refurnishing a very effective midway course may be adopted by reducing the main limbs to one-half their original height and reworking at that height while refurnishing the lower

framework. The work is cut down by 50 per cent., and at the end of the third season's growth equal height and bearing surface, as in comparable trees fully furnished, is secured, but with a reduced yield for the first two seasons of cropping.

—N. J. Adamson, Orchard Instructor,
Hastings.

Citrus Culture.

Establishment of the Young Orchard.

WHERE preparations have been made for planting this season but have not been completed because of unfavourable weather conditions, the operation should now be carried out as soon as possible. Later planting involves the risk of the trees dying through insufficient moisture, so that unless all the preliminary preparations have been made it is unwise to attempt to plant this year. There is no greater mistake which is more commonly made by citrus-growers than planting in a hurry. Too often a grower feels that unless planting is done soon after the purchase of a property a year or more is lost. The opposite is the case.

With a well-worked soil and adequate shelter a young citrus grove will rapidly overtake and later completely outclass a grove planted in a hurry. If trees have not been already ordered it is wiser to delay planting another year, even if the soil conditions are good and shelter

satisfactory. Practically all the better-class trees are ordered early in the planting season, and only the inferior ones remain at the end of the same season.

Application of Manures.

However, if trees of good quality have been secured one can assume that the site has been pegged out, holes dug, and the operator is ready to commence planting. Unless the area has been sub-soiled it is unwise to dig deeper than the worked soil, although the breaking-up of the subsoil in the hole with a pick is beneficial. Any well-rotted organic manure or humus placed in the hole—3 ft. diameter and 1 ft. deep—will be beneficial, or if these are not available 1 lb. to 2 lb. of blood-and-bone manure spread towards the circumference of the hole will also be of value.

Prior to the receipt of the trees from the nurseryman a long, shallow trench should be prepared under the shelter of

a hedge. Upon arrival, the trees should be laid out according to varieties and damaged roots pruned. All roots should be covered at once with soil, and this should be packed firmly if the trees are to be left for more than a day or two.

The orchardist is well advised to classify his trees according to general appearances before laying them out. This will assist in uniformity, and will also often explain future behaviour. All ill-shaped trees and trees with bench root, &c., should be discarded. Even if the grower suffers the direct loss of the cost of these trees it will be much less than the loss he will suffer by their maintenance. Finally, it is well to be sure the trees are worth planting. It is better to lose £15 per hundred trees at the time of planting than to find that for years to come you are keeping the orchard instead of the orchard keeping you. This is the grower's last chance to establish a good orchard.

Planting the Trees.

When planting is to begin the trees should be laid out over the area to be planted. Each tree is placed on the side of the hole in which it is to be planted and the roots covered again at once. Planting is a relatively simple operation, but on no account must it be hurried. Two operators are sufficient for a small area. The orchardist himself should always plant his own trees. Hold the tree vertically, with the junction between scion and stock above the notch in the planting-board. See that the roots are well spread over the cone of top soil replaced in the hole.

This cone of soil should be well built up, as it can be easily worked down by the hands in planting, but it cannot be as readily built with the tree in position. Having covered the roots and three-parts filled the hole, tramp the soil lightly but firmly. The fibrous rootlets must not be broken, or the tree is set back. A stake set in at an angle is then firmly secured to the tree. When the tree is firmly established this stake is removed, and care must be taken to remove the

whole stake, as cases have been known where a fungus has attacked the remains of the stake and then affected the tree-roots, with the loss of the tree.

In the newly-purchased orchard property, this month should be utilized in planting the neces ary shelter-belts. More detailed notes on suitable varieties are published in the May issue of the *Journal*, page 365.

Standardization.

With reference to the present grades or lemons, it has been decided temporarily to include the 252 count in extra fancy, fancy, and good grades.

There is no need to use the 1d. inspection-fee stamps on any variety of citrus except lemons at present, but it is necessary that such fruits should have the following details stencilled on the case in the following manner:—

Upper left-hand corner—Name :

Address :

Lower left-hand corner—Reg. No. :

Lower right-hand corner—Variety :

Count or
lot :

In addition, lemons require the revenue stamp of 1d. on the bushel and $\frac{1}{2}$ d. on the half-bushel in the right upper corner, and the variety, grade, and count in the lower right-hand corner.

New Zealand Grapefruit.

For all grapefruit-growers the following packing chart should prove of value for the standard bushel case:—

Style of Pack Crosswise.	Number in Rows Lengthwise.	Number of Layers.	Count.	Sizes.
				In.
2-2	3-3	5	60	$3\frac{1}{2}$ to 4
2-2	4-3	5	70	$3\frac{1}{2}$
2-2	4-4	5	80	$3\frac{1}{2}$
2-2	5-4	5	90	$3\frac{1}{2}$
2-2	5-5	5	100	$3\frac{1}{2}$
2-2	6-5	5	110	$3\frac{1}{2}$
3-2	4-4	6	120	$3\frac{1}{2}$
3-2	5-4	6	135	3
3-2	5-5	6	150	$2\frac{7}{8}$
3-2	6-5	6	165	$2\frac{1}{2}$ to $2\frac{3}{4}$

—A. M. W. Greig, Orchard Instructor,
Auckland.

Viticulture.

The Vinery and Cellar.

OUTSIDE borders should now be fairly warm, and, if dry, they can be first watered and then treated with liquid manure, covering the whole up with a mulch of stable manure or, if this is not obtainable, with straw to prevent the moisture evaporating.

A growing-temperature should be kept up in the vinery by means of careful ventilation, avoiding checks, which are frequently caused by opening the ventilators too wide when the outside air is cold, or opening them on all sides at once. As previously advised, the bottom ventilators should be kept closed.

Mealy bugs have been exceptionally prevalent, and have caused considerable damage in some districts during the past season. If kept under at this period there should be little or no trouble from them when the grapes are ripe. Whenever one of these pests is seen it should be at once destroyed with a drop of methylated spirit. In cases where they are too numerous to be exterminated in this manner nicotine sulphate 40 will be found effectual when used as a spray at 1 to 800, which is equal to a little more than a teaspoonful to the gallon of water.

Soft water should be used, and a teaspoonful of soap mixed with it will increase the effect of the nicotine.

The Cellar.

Young wines should be racked a second time before they begin to move. A slight fermentation is almost sure to set in, more especially in the white wines, as the weather grows warmer. Allowance should be made for this by keeping the bungs slightly loose, replacing them with small bags of clean sand, or plugging the bung-holes with a piece of cotton-wool. The object is to keep out harmful bacteria and at the same time to allow the extra carbonic acid gas to escape, and so to avoid the blowing-out of the bung or bursting of the container and the subsequent loss of wine.

Occasionally it is considered desirable to rack wine which is undergoing a slight fermentation. To do this the wine can be pumped into a clean, well-sulphured cask. The sulphurous acid taken up by the wine will cause the fermentation to cease, and the wine will become bright and clear and can then be separated from the lees. Young wines should not be

transported any distance at this time of the year; nor should they be bottled unless absolutely still, clear, and bright.

The Vineyard.

In the vineyard a disking after ploughing can be proceeded with for the purpose of breaking up and aerating the surface soil and preventing the growth of weeds. Deep cultivation is not advisable because of the liability of injury to the fibrous rootlets which, in the moist climate of most parts of the Dominion, grow near the surface. In most districts the first and second ploughing or disking should not be deeper than 4 in. and further cultivation not deeper than 2 in.

The soil should not be worked when the vines are in bloom. The use of the plough at this period may result in the non-setting of the grapes. Nor should cultivation be proceeded with on low-lying land when frosts are expected, as disturbing the soil results in lowering the temperature near the surface and so favours the production of white frost.

—J. C. Woodfin, Vine and Wine
Instructor, Te Kauwhata.

Cool Storage Notes.

Pears and Apples in Storage.

WINTER NELIS should be frequently inspected for the spec rot that develops so quickly and is caused by seasonal conditions. The time of its development is affected by a delay of storage after picking, or by faulty cool-storage conditions.

Discoloration of pears in cool storage and immediately following storage is found in a number of varieties. The causes are a tendency in the variety to be affected by seasonal conditions. Some of the varieties subject to this fault will not develop the tendency until near the end of the season, while other varieties will discolour quite early in the season, sometimes in storage, or shortly after removal.

Discoloration in Pears.

A few of the varieties most subject to discoloration and breakdown are: Marie Louise, which often breaks down quite early in cool storage, even under good storage conditions; Vicar of Winkfield, which is a good-quality cooking variety, although its appearance is against it, and which is an unreliable cool-storage variety as it will often discolour in storage or immediately after removal; Beurre Capiaumont, which is a poor-quality pear and an indifferent cool-storage performer; Madam Cole, which is not a good-quality pear, but is a fair cool-storage variety under good storage conditions.

Many other varieties have these faults and have gone out of favour; others which hold for long periods in cool storage but lack quality have also gone out of favour.

Export Varieties.

The export varieties which should be concentrated on for the Dominion export trade and local market requirements are: Josephine de Malines, Winter Cole, Winter Nelis, P. Barry, Packham's Triumph, Beurre Bosc, Doyenne du Comice, Glou Morceau, Harrington, and Conference.

The three recognized late-keeping varieties are Josephine, Winter Cole, and Winter Nelis, but like most varieties of fruits, they are affected by seasonal conditions, and must be well grown, carefully handled, and cool stored under ideal conditions to obtain the best results.

Inspection of Apples.

Granny Smith apples which were picked early in the season should be tested by bringing a few apples out of the cool store and placing them in a convenient position for inspection. If the samples do not show signs of discolouring after a few days' trial the line should hold for some time.

Tests of this nature should be made every few weeks as the end of the season

approaches. This will give an indication of when to market this class of fruit to avoid loss. Judgment in time of picking and state of maturity when cool storing Granny Smith apples is necessary to obtain the best results from the cool storage and marketing of this most popular variety.

Sturmers, unless of good quality and firm in texture, should not be held too late in the season, especially the larger counts, as this class of fruit, when over cool stored, has a detrimental effect on the demand for the variety.

Varieties for Best Returns.

The varieties of pears and apples which bring the best returns over a period of years are those that may be exported successfully, find a keen demand on overseas markets, and also have a cool-storage life, which plays such a large part in the even distribution of fruit throughout the year on our local markets without undue losses from early breakdown tendencies, which are found in many varieties of pears and apples. These are known as "unreliable cool storage varieties."

Regular attention should still be given to blowing out of cool chambers.

—A. Powell, *Cool Storage Officer, Wellington.*

Tobacco Notes.

Reconditioning Tobacco.

WHEN tobacco is flue-cured in the farmers' kilns near to the plantation where it is grown it is too dry and brittle to sort or grade, and it is therefore packed in stacks on the sticks as it hangs in the kilns. This is called bulking down. While in the bulks the colours improve, green side-veins disappear, green tints and discolorations fade away, and the true colours are established.

Tobacco remains in the bulks for anything from two to three months, and during this time, which is always the wet winter months, the tobacco absorbs moisture from the air and becomes soft and pliant, is easy to handle without breaking, and will stand pulling out

flat, &c. When in this state the grading of the leaf into the various grades set by the manufacturing purchaser is undertaken. If the weather is very cold the leaf will not absorb so much moisture, but if warm rains or early spring conditions occur the tobacco attracts far too much moisture, and, as usually happens towards the end of the grading season, it will contain from 20 per cent. to 24 per cent. of moisture.

Moisture Content.

To be packed for export, or for storing in New Zealand, tobacco must not contain more than 12 per cent moisture; otherwise it will overheat in the packages and be spoilt by a sour smell, by yellow

moulds, and, if nothing is done to prevent it, spontaneous combustion may destroy the package by fire.

Reconditioning tobacco is the business or commercial method of extracting the surplus moisture (or, as it is usually called, farmers' moisture) above 12 per cent. so that the tobacco may improve, and by the correct fermentation eliminate all the excess nitrogenous matter. Fermentation of nitrogenous matter produces a protein, which further ferments, producing starch, starch ferments, and sugar.

This is the chemical action that is desired in all good, sound, smoking tobacco, and that fermentation is governed by the amount of moisture that

the package of tobacco contains. If the tobacco is too wet, fermentation is too fast, and cannot be stopped. If moisture is too scanty, say 8 per cent., no fermentation takes place, and the tobacco makes no improvement but retains all the nitrogenous evils, and will burn with the smell of old rags. The owner will have to resort to the addition of essences and burning flavours to hide the immaturity of the tobacco. This can be done to the satisfaction of the smoker, but the non-smoker or the smoker who is not smoking can detect the evil smell, in spite of rose, musk, and tonkin bean.

Process of Fermentation.

None of these ingredients is allowed to be added to tobacco smoked in England, and the tobacco must be landed there in a package weighing 875 lb. to 900 lb., 4 ft. high, with a diameter of 4 ft. This is called a tierce, and, if the moisture content is from 11 per cent. to 12 per cent., the correct fermentation will commence twenty-four hours after packing and continue on and off, getting less and less, until in two years it has ceased altogether. The package will keep good and sound from eight to ten years. We have tobacco sixteen years old, sweet and sound (air-cured), and flue-cured tobacco packed in W. H. Owen's barn in 1928.

These facts have been known to American tobacco packers for many years, with the result that several machines have been made and used for the reordering or reconditioning of tobacco. The machine which has survived the test of time and become the universal favourite in America was made by the Proctor Schwash Tobacco Machine Co., of Philadelphia, and tobacco treated by this machine is called "proctorized" tobacco, and is accepted by English manufacturers as the best pack.

In 1935-36 the writer visited many tobacco-factories in England, and everywhere manufacturers claimed that only "proctorized" tobacco would keep sound in England. The Minister of Finance, the Hon. Walter Nash, caused exhaustive inquiries to be made into the matter. An evaporator plant was under examination, but was turned down as not being up to the required standard.

Improving New Zealand Tobacco.

In November, 1937, the Government bought a Proctor Schwash tobacco-machine. It was bought not because the growers wished for it, but because the Government knew it was needed if export tobacco was to be successful. It will put our export tobacco on a level with the world's best packs. We know the leaf is good, and the method of the



The export tobacco bond store at Motueka.

steam humidore was the only weak spot in our pack. New Zealand tobacco, when "proctorized," will be equal to anything in London.

I have had the privilege of supervising the dismantling of the machine in Auckland, packing it in 173 packages, sending to Motueka Bacon Factory, designing the Export Tobacco Bond Store, and assisting the Public Works Department in the erection as clerk of works in an honorary capacity. The works were officially opened by the Hon. P. Webb and Government officials on the 25th July, but leaf had been received on the 18th July,

Six weeks were required to dismantle the machine and pack it. Eight weeks

were spent in rebuilding the Proctor machine, but this work could not commence until the cement floor 154 ft long and 80 ft. wide was laid and set hard, so that growers having export tobacco had to wait longer than was desired. This, however, allowed for all leaf under contract to manufacturers to be supplied first, and the export tobacco bond store is the only one operating at the present time, with a staff of fifty girls and six men.

A description of the working of the Proctor machine will be continued next issue.

—Charles Lowe, Tobacco Instructor,
Motueka.

COMMERCIAL FERTILIZERS

"Commercial Fertilizers and Their Basis of Sale" is the title of a text-book covering the whole field of manures used on a commercial scale in New Zealand, which has been prepared by Mr. J. A. Bruce, late Inspector of Fertilizers to the Department of Agriculture. Nobody connected in any way with the land can afford to be without the information contained in its pages. The price is 3/6, post free, and all you have to do is fill in the coupon.

"FERTILIZER,"
Box 882, WELLINGTON.

Please post me a copy of "Commercial Fertilizers." I enclose a postal note for 3/6.

Name : _____

Address : _____

A.J.

Vegetables, Small Fruits, and Flowers.

Contributed by the Horticulture Division.

Vegetable Crops for Present Planting.

OCTOBER is not the least important month of the planting season. Besides completing the sowing of hardy main crops, the following half-hardy crops are started in most districts: Kidney beans, gourds, sweet corn, tomatoes, egg plants, and peppers. Also important are the seed-beds of savoy and red cabbage, cauliflower, broccoli, and kale sown for planting out two or three months later to mature during autumn and winter. These crops provide a valuable and varied supply during the summer, autumn, and winter seasons.

A rich, free loam and well-sheltered position is required to obtain the best results from the half-hardy crops. Beans and gourds are among the oldest of our vegetable crops. The broad bean (*Vicia faba*) is a hardy native of Europe which in ancient times was extensively grown; during later years it has been almost entirely displaced by the kidney bean (*Phaseolus vulgaris*), which, with so many other useful culinary plants, was introduced from South America. Its usefulness in either a green or dried state makes the kidney bean available over a long period and thus a vegetable of the first importance. Land well supplied with humus should be given a good dressing of phosphates, and when the crop is up a light dressing of nitrate of soda as required. The seed is sown 2 in. or 3 in. deep, and 3 in. or 4 in. apart, with 18 in. to 30 in. between the rows.

Cucumbers and Melons.

The gourds have long been esteemed in warm and tropical countries, especially species of *Cucumis* (cucumbers and melons) and *Cucurbita* (pumpkins and marrows). The marrow, said to be a native of Persia, is the hardiest, and, used in a green state during summer, is an attractive vegetable.

The keeping-quality of pumpkins makes them of value in affording variety for winter use.

In many parts of the country the warm season is too short to produce a good crop of cucumbers and melons outside unless every precaution is taken to start the crop as early as possible. Excellent musk and water-melons are grown in the warmer districts here, and they are crops which could doubtless be extended with advantage. A rich, light, moist soil and good shelter are the main essentials.

Sweet corn is a variety of the field corn (*Zea Mays*), being distinguished by its high sugar content in its early stages of development and by its translucent kernels when dry. As a summer vegetable it is becoming increasingly popular. It is drilled 3 ft. to 4 ft. apart and the plants thinned to 8 in. to 10 in. apart in the drills. Golden Bantam is a popular early dwarf variety, and Stowell's Evergreen and Country Gentleman are vigorous late varieties that are popular. A continuous supply is obtained by sowing early and late varieties, or by sowing an early variety at intervals of two or three weeks. It should be gathered as soon as the silk withers if it is to be obtained in best condition, as the amount of sugar decreases as the kernels harden.

Half-hardy Culinary Fruits.

Egg plants and red peppers are of tropical origin. They are the last to be taken from the shelter of the frame, and should be planted out only when warm weather is practically assured. The increasing quantities reaching the market during summer indicate the greater interest taken in these attractive and useful culinary fruits. They are grown satisfactorily only in the warmer localities.

Towards the end of October tomato-plants are planted outside in many districts; in the cooler localities early November is often soon enough. As a good crop can be expected only from good plants, every effort should be made to ensure they come up to that description. Good plants are of a satisfactory strain, young and sturdy, well developed, free from disease, and thoroughly hardened off. In well-prepared ground such plants will come away with little trouble under ordinary conditions. A generous dressing of phosphates, usually applied in the form of superphosphate and finely-ground bone-dust, and a moderate dressing of sulphate of potash are the chief fertilizer requirements. If the land is rich in organic manure the potash dressing should be correspondingly increased.

Under glass this crop is now reaching a stage when the growth is of such dimensions that the amount of air in the house is much reduced, while at the same time the volume of vapour from transpiration is greatly increased. As a result, a humid atmosphere, which often reaches high temperatures, is created. These conditions are most injurious to this crop, and should be avoided by providing ample ventilation. In sheltered, warm localities this requirement is often very considerable, especially if the climate is also generally humid. By such constant attention at the present time flowers and foliage will have the substance and vigour to function properly and will be less likely to suffer from leaf-mould and other diseases. In most districts ventilation at night will also be necessary at this time.

Small and Sundry Fruits.

Tree tomatoes, Cape gooseberries, and passion vines may now be planted out

These require a relatively warm position to obtain the best results, as they are natives of Peru or Brazil. *Cyphomandra betacea*, as the tree tomato is called by botanists, is a semi-shrub with large, soft leaves, and grows here to a height of about 6 ft. to 8 ft. Its bronze foliage is quite ornamental, as also are its large, smooth, oval fruits, which ripen in mid-winter. These are generously produced by plants growing in a rich, moist loam and well-sheltered position. There is a fairly steady demand for the fruit, which is suited to culinary purposes and makes an attractive dish under good management. A small planting only is usually made, the plants being set about 6 ft. apart.

The Cape gooseberry (*Physalis peruviana* var. *edulis*) is well established in favour, and might well receive attention for commercial cropping by those who have light land in a warm position. To ripen the full crop before the autumn frosts intervene, good plants should be set out early and kept growing steadily. A good dressing of phosphates and some sulphate of potash will suit them best. The plants may be set 3 ft. apart with 6 ft. between the rows where no support is given. The Cape gooseberry is a perennial herbaceous plant, cut down to the ground by frost in autumn, but when the tops are cleared in early spring and a good dressing of fertilizers is cultivated in they will grow away and produce a second and even a third crop.

The Passion Vine.

The passion vine (*Passiflora edulis*) has received a great deal of attention during recent years, sometimes, perhaps, too much, but the unique flavour and fragrance it imparts to salads confers a distinction that will always make this fruit popular for that purpose. It is also to be remembered that six or seven years is the extent of the life of a plantation, so that any overplanting which may have been done in some localities is not a very permanent feature.

Although not exacting as to soil conditions, good land is necessary to produce full crops each season over the whole life-period of the plantation. Good drainage and shelter are also essential. To enable spraying for the control of disease to be done effectively it is essential that the vines be trained and pruned annually to avoid an accumulation of old, unnecessary growth and to maintain a good supply of the new laterals on which the crop is borne.

Setting Out the Plants.

Plants may be set now 10 ft. apart at the base of stout stakes and posts standing 5 ft. out of the ground. With a distance of 9 ft. between rows it will take 480 plants to the acre. Two No. 8 galvanized wires, one each side of the top of the post and another 3 ft. below them, should

be made fast to well-strutted strainer-posts, tightened and secured. By stopping laterals after a few leaves have formed growth is concentrated in the leader, which, when the top of the post is reached, is stopped to make it break into side growths, which are trained along the top wires and form the bases from which the fruiting wood springs. Where it is desired to plant passion fruit next season the seeds from selected fruit may now be sown in boxes, pricked out into other boxes later, and then grown in sheltered cradles until required for planting out.

Land for autumn planting in strawberries may now be planted in an early vegetable crop and thoroughly cleaned so that it will be ready when required. Where it is intended to plant bush fruits next winter a main crop of vegetables may be grown now and a similar routine followed, which secures adequate preparation with economy.

Daffodils for the Shrubbery Border.

Few gardens in this country are complete without a liberal display of daffodils to supplement the flowering shrubs during the winter and spring of the year. Rather large groups, each composed of a single variety and planted in the foreground of a shrubbery, are perfectly happy with little attention for a few years if they have the vigorous constitution necessary for garden planting. Some of the older varieties have the necessary qualities to fill these requirements admirably, but a great many have been entirely superseded by the fine, new seedlings which have been introduced during recent years. These now form a very long list, and, while most of them have the quality which warrants registration, a very much smaller number have, in addition, the vigour which is necessary to warrant their being used for display in the garden borders.

To assist planters in making the best selection for this purpose the Royal Horticultural Society has concluded a three-year trial in their Wisley garden, and recently published the result in the July number of their *Journal*. Of the

262 varieties of the newer kinds under trial the following are among those which received the higher awards of merit. The method was to plant twenty-five bulbs of a variety in a clump, the clumps being distributed through a shrubbery border as in an ordinary garden, and to keep them under supervision of a specially appointed committee. Varieties receiving awards carried from fifty to one hundred blooms in the third year.

Daffodil Awards.

The large trumpet varieties were among the earliest to flower, and those receiving the higher awards among yellow trumpets were Brandon, Decency, Solferino, Sulphur, Winter Gold, and Wrestler. In the white trumpets there were Roxane and Pacific, and in bicolor trumpets, Mrs. E. C. Mudge.

In the large-bright-cup section (*Incomparabilis*) there were: Havelock, Ambule, Carlton, Garibaldi, Grenade, Helios, Jubilant, Killigrew, Lucinius, Red Defiance, Smeroe, Yellow Bird, and with a light perianth, Folly, Eva, Marian Cran, Warlock. In the short-bright-cup section (*Barii*), Dinkie, Nanny Nunn, and Ming received awards, and in the section devoted to white, or whitish, cups, large or short (*Leedsii*), Marmora and Tunis received the highest awards. Others receiving good awards were Cicely, Grayling, Hera, Mitylene.

Interest to Rock-gardeners.

Rock-gardeners will be interested in the hybrids of *Narcissus triandrus* and *N. cyclamineus*. Those of *Narcissus jonquilla*, which always make a wide appeal with their grace and perfume, include Golden Sceptre, Lanarth, Trevithian, Aurelia, Hesla, and Yellow Prize.

In the section known as Tazetta or Poetaz it comes as no surprise to find Scarlet Gem received the highest award. The clumps bore 26 flower-stems the first year and 79 in the third year, with the variety Glorious as a very fine second.

Such variety trials are invaluable to planters. By planting the most suitable material in an understanding manner time and money are saved and good results are obtained without delay.

—Wm. C. Hyde, Horticulturist.

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Work for the Month in the Apiary.

Treatment of Swarming and After-swarming.

LEADING authorities are mostly agreed that the instinct for natural increase is the cause of swarming. Many beekeepers attribute swarming to overcrowded brood-chambers, lack of ventilation, and poor queens, but it often happens that swarms issue when none of these conditions is present. On the other hand, bees will refuse to swarm when everything is apparently conducive to their doing so. It must be left to the beekeeper to decide whether he will increase his stock by natural swarming or artificially.

If the former plan is adopted it will be wise to allow only strong colonies to swarm. If a weak hive is showing symptoms of swarming—that is, if the bees are building numbers of queen-cells—these should be removed and the colony prevented from swarming until such time as it can be requeened. A swarm from a weak hive is not worth encouraging, because it consists simply of a poor queen, probably failing, and a small cluster of bees.

If, however, a strong colony has made up its mind to swarm the best thing to do is to allow it to throw a prime swarm and then to guard most rigorously against after-swarming. This can best be done by cutting out all the queen-cells save one after the prime swarm has issued. Even then it is wise to watch carefully the parent hive for about ten days after the departure of the prime swarm, because there will be eggs in the old hive and the bees may continue to raise queen-cells.

Hiving Swarms.

When a swarm issues and is headed by a laying-queen it will, after circling in the air for a short time, probably settle on some tree or shrub. As soon as the swarm has settled into a cluster, shake all the bees into a box. Place the box on its side and cover with a clean sack, leaving a small opening for the bees to fly in and out. The swarm may be left alone until late in the afternoon.

If by that time it has formed a compact cluster in the box the beekeeper will

know that all is well and that it contains a queen. Have the hive in readiness and placed in position where it is to remain. Place a clean sack in front of the entrance, having propped up the front to allow the bees a good space to enter the hive. Dump the bees on the bag as close to the entrance as possible, and very soon they will make their way into the hive. The bag can then be removed and the hive be lowered into position.

In districts where foul-brood is present, or if the beekeeper is suspicious of his own colonies, it is wise to leave the swarm in the box for at least three or four days. At the end of this period place the bees in the hive as described, always choosing the late afternoon for settling them in their permanent home. The object of this practice is to induce the bees to utilize the honey in their sacs to draw down comb and thus rid themselves of honey from the parent hive. If this procedure is followed there will be far less trouble from disease, and swarms will invariably start clean.

Feeding the Swarms.

Unless there is a good honey-flow, or if bad weather sets in, the swarms should be fed inside the hive. This is to give them a good start and to provide them with material for producing wax. Excellent combs can be produced from sugar-syrup. It is advisable in all cases to have the swarm on full sheets of foundation and thus take advantage of the natural instinct of the bees to produce wax after swarming. Very little time will be gained if the bees are put on drawn-out combs.

In the course of a few days it is advisable to examine the frames to note if the queen is laying and to see if the foundation is being drawn out. When the swarm is placed in the hive one should not forget to put a mat on top of the frames. It often happens that unless precaution is taken to confine the bees they will commence operations in the roof of the hive, more particularly if gable roofs are used.

Prevention of Swarming.

Frequent examinations of the colonies—every week or ten days during the swarming-season—for the purpose of cutting out queen-cells is a help, but this requires considerable work, and as it frequently fails in spite of every care, it is not usually relied on.

The occurrence of swarming is largely due to overcrowded brood-chambers; hence the queen should be given plenty of room to lay. A suitable plan is to give a new brood-chamber comprising two drawn combs and the rest frames of foundation. Secure the queen and confine her in this new chamber below a queen-excluder, placing the old brood-nests directly above, thus giving additional work for the young bees and plenty of room for the queen to lay in. If for some reason this plan is not desirable, the brood may be equalized by robbing the stronger colonies for the benefit of the weaker.

A young queen in the hive is an outstanding factor of success, as bees are rarely inclined to swarm with a young queen if they have reared her themselves under natural conditions. This feature, however, is not always satisfactory to the beekeeper, as he frequently buys young queens in large numbers from a queen-breeder. He still has to contend against the swarming impulse, although in a lesser degree. A beekeeper rearing his own stock should select not only prolific queens to produce from, but also those that have previously shown the least tendency to swarm. There are also other reasons why young queens should be employed, and the practice of introducing them in the spring before the swarming-season commences, at intervals of not longer than two years, is a very excellent one.

Introduction of Queen.

Autumn introduction is also commendable, as the full tide of a queen's maturity is gained from the commencement of the following spring. In order to follow the lives of the mothers as closely as possible

and to avoid mistakes some system of recording the various ages must be employed. In addition, notes should be taken of their general behaviour, such as tendency to swarm, prolific reproduction, and gentleness. Such notes will prove of great value in selecting a mother of future queens.

Ventilation also plays an important part in controlling the natural inclination to swarm, and care should be taken to provide sufficient air at all times of the season. A well-known and effective method is to place blocks 1 in. in height under the two front corners of the brood-chamber. In the very flush of the honey-flow additional ventilation may be given by drawing one of the supers forward over the rest. This forms two additional entrances and permits the workers to escape to the field without having to traverse the whole depth of the hive.

No single system will be found universally effective. Climatic conditions, also, frequently play an important part in the behaviour of bees. It will, however, be

found that the methods given or variations of them, employed either singly or in combination, will materially assist in the prevention of swarming.

Prevention of After-swarming.

In many cases a prime or first swarm is desirable, and in others they often issue in spite of precautions. It is a simple matter to hive the swarm, but to combat the results in the parent colony arising from this condition entails special action. Persistent after-swarming is one of the discouraging features of natural increase and is often hard to stop.

A good plan is to place the swarm on the old location, removing the parent colony to a new stand some distance away. The immediate result is for all the flying bees to join the swarm, and thus the parent colony is still further weakened. This encourages them to tear down all queen-cells but one, or to destroy all embryo queens after the first young queen has emerged from her cell.

Treatment of Swarms.

There is little doubt in the minds of many of the beekeepers who have been accustomed to box-hives as to the surplus to be obtained from a swarm. It is not uncommon to find swarms put into frame-hives and not provided with room for surplus. Unless supers are given to strong, early swarms from ten to fifteen days after they are established these colonies will often swarm again, and no surplus will be obtained.

It must be understood that the season plays an important part in the returns netted, but large amounts are lost yearly through the beekeeper neglecting to give ample room for the swarm to store honey. When a swarm has been established a few days a hurried examination should be made to note progress, and from this the beekeeper will be able to form some idea as to the time at which the super will be required.

—E. A. Earp, Senior Apiary
Instructor, Wellington.

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No Strain in the Train.

Poultry-keeping Section.

Preparations for Egg-export Season.

EGG-PRODUCERS in the Dominion are cognizant of the fact that the export season is again with them and that shipments are being arranged for markets overseas. They should also realize that in order to maintain the reputation that New Zealand eggs enjoy on the London market great care must be taken to ensure that only the best quality is sent forward.

Freshness, cleanliness, size, and flavour are the most desirable qualities in a good marketable egg, and every egg exported is carefully graded. The size is gauged by weight, the shells are tested for firmness, each egg is individually tested before a strong light for freshness, the air-cell must not be more than $\frac{1}{16}$ in. in depth, the contents must be stationary—i.e., white, firm, and clear, the yolk dimly visible through the shell, of good colour, and no development of the ovum.

Soiled Eggs.

Only absolutely clean eggs are passed for export, and it may be contended that more eggs are rejected each year because of the shells being soiled than for any other cause. If, however, sufficient clean nests are available, with clean, dry nesting material, and eggs collected at least twice a day, especially during wet weather, much of this trouble can be avoided.

Freshness.

The value of an egg depends on its freshness and flavour, and for this reason every care should be taken to see that eggs are sent to market regularly, at least once a week, and that they are kept in a cool and suitable place while being held for market.

Flavour.

Every poultry-keeper, especially the commercial egg-farmer, is naturally anxious to see the demand for eggs increase at, of course, a payable price, but, unfortunately, all do not seem to realize how readily the flavour of an egg can be spoiled. Experience has proved

that eggs very quickly absorb objectionable odours. For example, if they are left in damp and dirty nests for twenty-four hours, or stored in close proximity to strong-smelling materials, such as decaying fruit and vegetables, their flavour is likely to be adversely affected.

Common Factors.

Among the most common factors which are contributory to the flavour of eggs being spoiled, the following may be instanced:—

- (a) Feeding musty grains or other foods.
- (b) Allowing laying hens free access to pigsties or manure-heaps, where they are apt to pick up unpleasantly flavoured food.
- (c) Wiping eggs with soiled or tainted cloths.
- (d) Using tapes on egg-washing machines after they become soiled or tainted.
- (e) Packing eggs in fillers before thoroughly dry.
- (f) Storing eggs in more-or-less heated rooms while holding for market.
- (g) Allowing eggs to be exposed to the hot sun in transport to market.

These are details which concern all poultry-keepers, both large and small, and while there has been an undoubted improvement during the past few years in the general condition of eggs reaching the market, there is still room for improvement. It is felt, therefore, that if all egg-producers are made aware of the foregoing facts they will do what they can to protect their own interests and strive to uphold the good name that New Zealand has enjoyed for her produce.

Natural Incubation.

As hot summer weather retards the growth of chicks and as during that period they are more likely to become infested with vermin it is not advisable to hatch chickens after October. Late birds seldom or never do well, and for the

reasons stated it is advisable to arrange for the required number of chickens to be hatched as soon as possible.

Hens of the general purpose breeds, such as Orpingtons, Rhode Island Reds, Sussex, &c., usually prove the most satisfactory mothers. While it is true that some Leghorns, and also hens of other light breeds, do go broody at times, they cannot be depended upon and do not make the best matrons.

Special Quarters.

Broody hens should never be set in the fowl-house, where they are likely to be disturbed by other hens. They should be placed in a special coop or shed, and when broody hens have to be moved from the laying-nest to where they are to be set it is advisable to move them at night. A couple of nest eggs should be placed in the new nest and the coop or box covered over so that the broody hen cannot get away, care being taken to see that ample ventilation is allowed. On the following night quietly remove the covering, and leave some feed and water near the nest. If the hen returns to the nest after she has fed it will be safe to place the eggs to be hatched under her. Twelve or thirteen eggs are quite enough to set under the average-sized hen. It is much safer to set one egg too few than one too many.

The nest is best made on the ground, and should be saucer-shaped, flat, and even on the bottom. Soft straw or pine-needles make good nesting material.

Dusting with Insecticide.

Before the hen is set she should be well dusted with an insecticide, and a second dusting is advisable after she has been sitting about a week. Under no circumstances, however, should a hen be deloused near the time that the chickens are due to hatch. The food for sitting hens should consist entirely of grain, together with the necessary grit and clean water. It is injudicious at this stage to

feed mashes or meat, as such a diet is likely to cause slackness of the bowels.

Stale ground is the cause of much trouble among poultry, and young birds in particular do much better on fresh, sweet ground. For this reason every effort should be made to see that chickens are raised on fresh uncontaminated ground.

How to Kill a Fowl.

The best way to kill a bird is by breaking the neck. Hold the legs and end of wings in the left hand and the head of the bird between the first and second fingers of the right hand in such a way that the bird's head is in the palm of the hand as shown in Fig. 1. Stretch the bird its full length, add pressure, and then give a sharp upward turn of the right wrist, and the neck is fractured at the junction of the neck and the head, as in Fig. 2.



The correct method of killing a bird by breaking its neck.

NO. 1 TEST.

Kerosene-heated Incubators: 120 Eggs set.

17 infertile eggs at first week.
24 dead embryos.
79 chicks hatched.

Control Hatch: 120 Eggs set.

17 infertile eggs at first week.
23 dead embryos.
80 chicks hatched.

BLASTING PARTICULARS.

Blasting carried out in face of tunnel, 75 ft. to 123 ft. from incubator room. Total number of shots fired during period of incubation, 459; total number of plugs of gelignite used, 1,473. Number of times per day blasting occurred, one to seven, between the hours of 8.48 a.m. and 10.30 p.m. Number of shots per day, 3 to 52; average, 29. Number of plugs of gelignite used per day, 9 to 202; average, 92; number of plugs used per hole, 1 to 7.

NO. 2 TEST: BLASTING LOCALITY.

Electric Incubator: 120 Eggs set.

22 infertile eggs at first week.
39 dead embryos.
59 chicks hatched.

Control Hatch, no Blasting Operations: 120 Eggs set.

19 infertile eggs at first week.
23 dead embryos.
78 chicks hatched.

Blasting Particulars.

Blasting carried out in face of tunnel, 183 ft. to 224 ft. from incubator room. Total number of shots fired during the period of incubation, 526; total number of plugs of gelignite used, 1,510. Number of times per day blasting occurred, one

to seven, between the hours of 7.30 a.m. and 10.30 p.m. Number of shots fired per day, 5 to 55; average, 27. Number of plugs of gelignite used per day, 8 to 177; average, 80; number of plugs used per hole, 1 to 6.

NO. 3 TEST: BLASTING LOCALITY.

Lamp-heated Incubator: 120 Eggs set.

19 infertile eggs at first week.
30 dead embryos.
71 chicks hatched.

Control Hatch: No Blasting Operations: 120 Eggs set.

23 infertile eggs at first week.
15 dead embryos.
82 chicks hatched.

Blasting Particulars.

Blasting in open quarry, 8 ft. to 60 ft. from incubator room. Total number of shots fired during period of incubation, 3,366; total number of plugs of gelignite used, 5,770. Number of times per day blasting occurred, four to twelve, between the hours of 8 a.m. and 4 p.m. Number of shots fired per day, 166 to 293; average, 224. Number of plugs of gelignite used per day, 267 to 557; average, 384; number of plugs used per hole, 1 to 2½. Total weight of gelignite, 716.8 lb.

Analysis of Results.

Four additional tests were carried out before the results were analysed.

A perusal of results obtained from both the test and control incubators shows very little difference in so far as hatchability is concerned. It seems obvious that where blasting is carried out in close proximity to incubator room it has little or no effect on the eggs set for incubation.

—C. J. C. Cussen, Chief Poultry Instructor, Wellington.



Effect of Blasting on Incubation of Hen Eggs.

(Taken from *Agriculture Gazette of New South Wales*.)

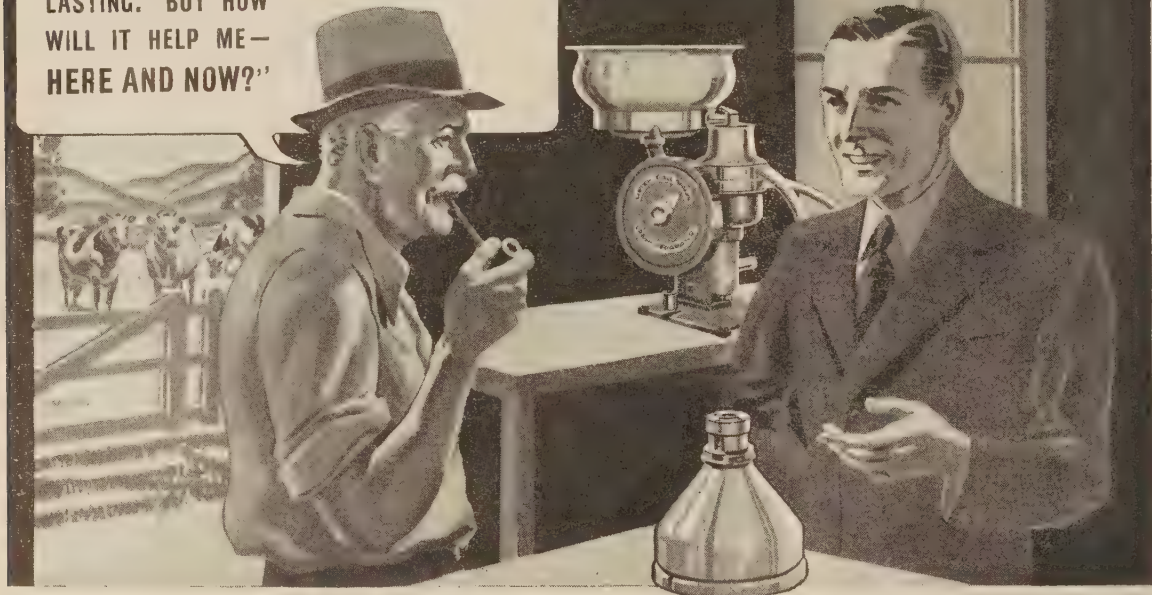
An interesting experiment was conducted in New South Wales recently to ascertain, if possible, whether blasting when carried out in close proximity to a poultry-farm had any ill effect on eggs set in incubators. While it is the general opinion among poultry-keepers that blasting has a detrimental effect on eggs in an incubator and is the cause of poor hatches, it is interesting to read the result of the various tests.

Two incubators of 140-egg capacity were used during the test, one being electrically heated and the other lamp heated. Both machines were operated in separate rooms of the same dimensions and in the same locality where blasting-work was in operation. At the same time that these tests were being conducted "check" incubation was being conducted in both electrically and lamp-heated machines in a locality where no blasting was involved. The eggs used in all test machines were obtained from the one farm and from the same pens, and each day's eggs were equally divided so that the age of the eggs and the numbers from each pen were exactly the same in the machines near the blasting as those used as controls.

Hatching Results.

The following are the hatching results of each of the two incubators operated near the blasting, together with those of the control machines operated in another locality where there was no blasting:—

Farmer: "I'LL ACCEPT YOUR STATEMENT THAT STAYBRITE IS PRACTICALLY EVER-LASTING. BUT HOW WILL IT HELP ME— HERE AND NOW?"



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Farmer: "It certainly is. Any other way?"

Lister Representative: "Yes. Staybrite Stainless Steel can never rust. Moreover, it is as easy to clean as glass, and always will be, as long as you use the separator."

Farmer: "I can appreciate how that will help me. And I'm certainly glad the Lister is British."

Lister Representative: "It is—100% made in England, which is our only butter market. It's only common sense to buy where you sell."



Farmer: "Well, I'm satisfied. The LISTER will do me."

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N.Z. Federation of Young Farmers' Clubs.



Edited by S. Freeman, Dominion Organizing Secretary.

President's Annual Report.

Record of Year of Definite Progress.

Presented to the fourth annual general meeting of the federation in Christchurch on 1st September, 1938, by the President, Mr. W. F. McLaren.

IT is with great pleasure that I submit to you the following report on the operations of the New Zealand Federation of Young Farmers' Clubs during the past twelve months.

A review of the year's work discloses a record of very definite progress. This is indicated by the additional clubs formed and the increased membership, as well as by the type of work and the activities that have been carried out by the clubs, district committees, and the organization generally. The record is such that I am indeed proud to have been your president during the period covered by this report. We can all of us, club members and advisory members alike, claim our share in the achievement and the knowledge that we have co-operated to carry out such a successful year's work is more than sufficient reward.

Clubs and Membership Increase.

Twelve months ago 122 clubs were affiliated to the federation, comprising 60 in the South Island and 62 in the North Island. To-day there are 160 clubs in the Dominion, 67 being in the South Island and 93 in the North Island. The clubs are divided up among the respective Council areas as follows: Otago-Southland, 33; Canterbury, 34; Wellington, 63; Auckland, 30.

The total membership a year ago was in the neighbourhood of 3,000; to-day more than 4,300 members are enrolled. The average membership during the period has also increased from 24 to 27. It must be intensely gratifying to the original members and those responsible for the first few clubs in the Otago



Mr. W. F. McLaren.

district to view the growth of the organization from the seed which they so successfully planted.

I have made a point during the past twelve months of visiting many of the districts in company with the Organizing Secretary, with a view to making contact with members and with all those interested in the Y.F.C. movement. I found keenness and enthusiasm everywhere, and my attendance at a number of district committee meetings throughout the Dominion has enabled me to see and understand more clearly the many local problems affecting organization and club work generally. I feel that I can claim, with diffidence, that these visits have rendered me during my term of office of more use to the movement, and have assisted in welding together the many units of the organization.

Feature of Year's Work.

A feature of the year's work has been the various accomplishments that can be regarded definitely as stepping-stones in the progress of the Y.F.C. movement. Of outstanding importance is the fact that the proposed alterations to the constitution of the federation were carried out; the original draft was modified and amended, it is true, but the better proportionate representation by active club members on all committees, councils, and executives, which was one of the main components of the original proposals, was affirmed. This has, among other things, resulted in quite a number of young men coming forward to hold executive positions in what, after all, is their own organization. The establishment under the new constitution of the four councils in place of the two Island councils is, I am sure, a step in the right direction. By overcoming some of the difficulties connected with travelling it is strengthening the organization by facilitating the meeting of delegates.

Of further importance is the adoption of the *N.Z. Journal of Agriculture* as the official organ of the federation. An offer by the Department of Agriculture was accepted by the federation, and, commencing with the January issue of this year, space has been provided for a special Y.F.C. Section in the *Journal of Agriculture*. The Department has further assisted the movement by greatly reducing the subscription to club members, and the *Journal*, which is a most interesting and useful publication, has already proved of great value to the clubs and the movement generally. I am strongly of the opinion that every Y.F.C. member should become a subscriber.

Tour to Australia.

A highlight of the year was the tour of South Australia and New South Wales by a team of five New Zealand Y.F.C. members, and the visit to this Dominion by the four United Kingdom young farmers who were with them in Australia. The tour by the United Kingdom and New Zealand members was arranged during the Australian Sesqui-centennial Celebrations. The New Zealand members were away from the Dominion for approximately two months and a half, and during that time were, for the most part, the guests of the Australian Junior Farmers' Clubs and kindred organizations.

The United Kingdom members accompanied our lads on their return to New Zealand, and spent about three weeks visiting places of interest in both Islands as the guests of the New Zealand Y.F.C. organization. It is hoped that this federation will be able to assist with the New Zealand Centennial Celebrations in 1940 by inviting teams of Empire Young Farmers to visit the Dominion, and I recommend that this matter be given early consideration with a view to making necessary arrangements, financial and otherwise.

Value of Competitions.

In connection with the Australian tour, the part played by the Manawatu District Committee in taking the initiative by instituting stock-judging competitions at the Royal Show, Palmerston North, last November should be placed on record. These competitions, with the backing of the federation, became a Dominion-wide activity, and were made the basis of selection for the team to tour Australia, an interesting and important feature being that the entry fees from clubs and members provided the major portion of the funds necessary to send the team overseas.

The competitions themselves were of great interest and value, and resulted in the gathering together of over one hundred Y.F.C. members from all parts of New Zealand. The interest thereby aroused has done much to stimulate Y.F.C. stock-judging competitions throughout the Dominion. In this connection, also, the agricultural and pastoral associations in both Islands have greatly helped by scheduling special Y.F.C. competitions, and have further assisted by encouraging Y.F.C. members to act as stewards at the shows.

District Committees.

I cannot say too much concerning the value and importance of the district committees; in my opinion they are the keystones of the Y.F.C. organization. Comprised of delegates from the clubs within their areas, they can form very

close links between the clubs, particularly where they are able to hold meetings fairly frequently. With their knowledge of local conditions and requirements they can encourage and assist the weaker clubs, arrange for inter-club and district activities, and stimulate the work in many and various ways. Some very valuable activities have been undertaken and carried out by district committees during the past year, among them being educational tours, judging competitions, debating contests, and the like.

Y.F.C. Tours.

Three inter-Island tours were carried out during the year. The Taranaki clubs sent a party of fifty members as far south as Invercargill, and a similar party from the Bay of Plenty clubs journeyed to Dunedin and Central Otago. The Christchurch and North Canterbury clubs combined to send a party of sixty members to the North Island, where they travelled up the West Coast to Hamilton, and back down the East Coast. About a fortnight was occupied in travelling in each case, motor-buses being used and proving an ideal means of transport. It is understood that a party from South Canterbury contemplates making a North Island tour shortly.

The Wairarapa clubs sent a party of twenty-four members on a bus tour as far as Auckland, and the Manawatu District Committee staged a camping tour in which 140 members took part, travelling in six motor-buses to Hamilton via Taranaki, over to the Bay of Plenty, returning via Rotorua and the Chateau. A party of Central Otago members made a tour of North Otago and South Canterbury, and a number of minor tours were arranged and conducted in various parts of the Dominion.

Value of Tours.

The value of these tours, both to the members and to the organization, cannot be denied. They have provided an educational and interesting holiday, given publicity to the movement, gathered together for the period a number of young men from various districts, given opportunity for club members to meet in widely scattered parts of the Dominion, fostered a spirit of companionship and hospitality, and, finally, provided members with an opportunity of seeing more of their own country and studying farming practices under varying conditions.

The increasing popularity of these tours, however, leads me to conclude that it may become necessary to provide for some

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system of co-ordination and reciprocation between the four council areas to safeguard the resources and hospitality of particular districts from being strained.

Competitions have been encouraged as a feature of club work, stock-judging, as mentioned before, being of prime importance. Many clubs make a practice of including a stock-judging competition, followed by a demonstration, at their field-days, while the Wairarapa District Committee has featured a special annual district judging day over the past two years. Hay and sheaf stacking competitions have been held successfully in a number of districts, as well as root-growing and other competitions in localities where they appeal.

Debating contests are coming to the fore, being first encouraged in the clubs and then carried out as district activities by the district committees. I am of the opinion that in competitions of major importance, such as stock-judging and debating, the ideal is to commence them in the clubs, then to hold district competitions, from thence to carry on to contests within each of the four council areas, and then to conclude with Dominion Championships. This is a task that I consider worthy of being attempted during the coming year.

Educational Weeks.

Successful educational weeks have been organized during the year, notable among them being a gathering of about seventy Otago and Southland members at Waitaki High School arranged by Mr. J. M. Smith, Fields Superintendent, Dunedin, a Y.F.C. Week in Wellington arranged by the Organizing Secretary for about ninety members from the Wellington Province and Marlborough and Nelson, and an Educational Week in Dunedin, arranged by Mr. A. C. Cameron, for more than one hundred members from Otago and Southland. A week was also held at Ruakura Experimental Farm for members in the Auckland Province. A week to be held at Lincoln College for Canterbury members had, unfortunately, to be postponed, because of an outbreak of measles.

All these activities were of a highly educative nature and also had the effect of drawing together representatives of clubs over wide areas. It has been interesting to note that in all cases members returned to their clubs and gave interesting reports on all they had seen and learnt while attending these educational weeks. The same also applied in connection with the educational tours.

"Cavalcade of Agriculture."

The Manawatu District Committee is further to be commended for the Young Farmers' Club's day carried out during the National Dairy Show at Palmerston North in June. A seven-a-side football

tourney was arranged, in which more than thirty teams competed, while the main feature of the day was the Cavalcade of Agriculture, in which more than one hundred farm implements were displayed, ranging from almost pre-historic down to modern times. Approximately one thousand members were gathered at Palmerston North and took part in the display and march-past. A Y.F.C. exhibit entitled "What Interests Us" was also on view during the period of the show and attracted much attention. The whole activity was a huge success and has done much to stimulate interest in Y.F.C. affairs.

Regular Y.F.C. radio sessions have been established, thanks to the co-operation of the various broadcasting stations. Talks are broadcast by club members, singly or in groups, and also by others connected with the organization, and may be heard fortnightly from 2YA, Wellington, monthly from 3YA, Christchurch, and 4YA, Dunedin, and also periodically from 1YA, Auckland. These broadcasts are listened to with interest by farmers, both young and old, and are proving a great source of publicity to the movement.

The South Island clubs, and those responsible, are to be congratulated on the fact that there are now five scholarships available for Lincoln College. Efforts in this direction in the North Island have so far proved unsuccessful.

Interest in Club Affairs.

The type of work carried out in the clubs themselves has shown a marked advance. The tendency for members to regard themselves as mere audiences at lectures is disappearing, and members are taking part in discussion and debate and are generally showing a greater interest in club affairs. They are steadily realizing that they themselves are part of a national movement—one of the greatest and most valuable movements yet inaugurated in New Zealand—and they are, with every reason, taking a pride in their organization.

The social side of club work is also being largely developed. Dances, card evenings, sports-meetings, football and cricket matches, &c., are all playing their part in assisting to recruit new members, and, what is more, are tending to make country life more attractive to the youth of the community.

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Tribute to Minister.

I wish to thank the Minister of Agriculture, the Hon. W. Lee Martin, on behalf of the federation for the keen interest that he has at all times displayed in the welfare of the Y.F.C. movement, and also for his efforts in obtaining from the Government a substantial grant towards the funds of the federation. This grant has materially facilitated the financing of some of the major Y.F.C. projects and has enabled assistance to be given to the councils by way of funds. This material recognition of the national worth of the Y.F.C. movement should stimulate all members and those connected with the organization to even greater activities.

I wish to thank the Department of Agriculture for its very valuable assistance, and to pay a tribute to the excellent work done by those of its officers who have been directly associated with the organization. The Department has provided us during the past two years with a full-time organizing secretary, Mr. S. Freeman, making itself responsible for his salary, expenses, and clerical assistance. With the fields officers of the Department acting as district secretaries, complete co-ordination has been secured throughout the Dominion and the smooth running of the organization assured.

So far as the organizing secretary is concerned, he has been long enough in the job to have proved himself. He is coping with the increasing volume of work in a more than satisfactory manner, and I consider that in his enthusiasm has been directly responsible for much of the progress that has been achieved. His zest for the Y.F.C. movement is without

It was thought desirable this month to publish the President's annual report in full, together with a short summary of the annual meeting. This has meant that, because of the exigencies of space, a number of items have had to be held over, but these reports will appear in the next issue.—Editor.

question, and his helpful advice and suggestions have been welcomed throughout the whole organization. For my own part, I am conscious that without his assistance during my term of office as president I would have found it difficult to carry on.

Acknowledgments for Assistance.

The federation is greatly indebted to the Department of Agriculture for the valuable assistance given by the officers

of the Fields, Live-stock, Dairy, and Horticulture Divisions in the way of lectures and demonstrations both at meetings and at field-days. These officers have, in many cases, given up their leisure time and travelled many miles in order to deliver lectures at evening meetings, and the federation owes them a debt of gratitude for their assistance in this direction.

I also wish gratefully to acknowledge on behalf of the federation the assistance rendered to the clubs, individually and collectively, by the New Zealand Farmers' Union, the agricultural and pastoral associations, the breed societies, the agricultural colleges, research institutes, the Women's Division of the Farmers' Union, and all others who have contributed to the progress of the Y.F.C. movement during the past year.

Finally, I wish heartily to thank all club officials and members and all associated with the organization for the admirable team-work and co-operation that has been responsible for such a successful Y.F.C. year. I hope that this year's attainments will stimulate all connected with the movement to further efforts that will result in still greater success and progress in the future.

(Signed) W. F. McLAREN,
President.

Report of Annual Meeting.

Decisions for Future Activities.

THERE was an attendance of thirty-six delegates and members at the annual meeting, which was very satisfactory, in view of the fact that it was held a month late. The gathering was very representative, delegates attending from the Auckland, Wellington, Canterbury, and Otago-Southland areas. In the absence of the President, Mr. W. F. McLaren, Wairarapa, who is recovering from an illness, the Vice-President, Mr. A. C. Cameron, Dunedin, presided.

The annual report, which indicated that very definite progress had been made during the year, was received with applause, and, after a brief review of organization and finance by the Organizing Secretary, the Chairman gave the meeting some very helpful advice regarding the Y.F.C. movement.

After routine matters of finance, &c., had been disposed of, various motions were considered, and among the decisions arrived at were the following:—

The age-limit for active membership (formerly fourteen to twenty-five years) to be extended to thirty years, with a recommendation to clubs that the executive positions be, as far as possible, held by young men between the ages of eighteen and twenty-five years.

The club membership fee of 2s. 6d. to be raised to 3s. 6d., the additional 1s. to include subscription to the *N.Z. Journal of Agriculture*, the monthly copies to be forwarded direct to individual members, thus ensuring that every member becomes a subscriber and receives the *Journal* regularly. Delegates commented freely on the value of this service rendered by the Department of Agriculture, and expressed their appreciation of the *Journal* itself.

Suggestions were considered regarding the invitation to overseas Y.F.C. delegates during the New Zealand Centennial in 1940 and the holding of a Y.F.C. camp at Wellington during the Exhibition. A proposal brought forward by the Manawatu delegates to inaugurate Dominion Championship Shearing Competitions at the Palmerston North A. and P. Show in November met with approval. Regarding stock - judging competitions, it was decided not to hold Dominion Championships this year; competitions for the North Island will be held at the Royal Show, Hamilton, and for the South Island at Lincoln.

The encouragement of debating contests was affirmed, and a proposal to conduct competitions in Council areas

following those being conducted in the various districts, with a view to working up to a final championship, was approved. The suggestion that organized visits between districts might be a possible alternative to district tours was also agreed to.

An appreciation of the work done by the Department of Agriculture and its officers who are closely associated with the organization was voiced by the meeting. In reply, the Director of the Fields Division, Mr. R. B. Tennent, said that the Department was giving all the assistance within its power, because it recognized the real worth of the Y.F.C. movement.

The election of officers resulted in Mr. Alan Grant, Waimate, being chosen to fill the office of President, and Mr. D. S. Ross, Bay of Plenty, the office of Vice-President. The meeting desired to place on record an appreciation of the valuable work done during the past year by the retiring President, Mr. W. F. McLaren, and expressed the hope that he would soon be restored to complete health.

Afternoon tea was served through the courtesy of the North Canterbury Farmers' Union. At the close of the meeting Mr. A. C. Cameron was accorded a vote of thanks for the capable manner in which he had acted as chairman.

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Among the Clubs: Reports on Activities.

Western Southland.

Diplon.—Lantern lecture by Mr. W. R. Harris on "Top-dressing."

Lochiel.—Evening devoted to speeches by members, the subject being, "What I would do if I were 'Boss' of the Farm." At the previous meeting Mr. W. R. Harris gave a lecture on "Winter Feeding of Stock."

Thornbury.—Lantern lecture by Mr. J. Danskin, Government Veterinarian, on "Stock Diseases." At the previous meeting a debate was held with a visiting team from Woodlands Club, the subject being "That Military Training should be Compulsory." This debate was the first one to be held in a contest for a cup donated by the Southland W.D.F.U., and was won by Woodlands Club, which took the affirmative. The speakers were L. Middlemiss, D. Campbell, M. Clark, and K. Hargest (Woodlands); O. Fallow, J. McLean, J. Mitchell, and J. J. Ronald (Thornbury).

Woodlands.—A description of the debate between the Thornbury and Woodlands Clubs, won by the latter, was given by L. Middlemiss. A report on the Dunedin Educational Week was given by T. Taylor, who represented the club. The main speaker for the evening was Mr. W. R. Harris, who gave a lantern lecture on "Phosphates." At the previous meeting Mr. W. Bell gave an address on "Compulsory Military Training."

Wynham.—Address by Mr. W. L. Harbord, Department of Agriculture, on "How to Conduct a Meeting." At the previous meeting Mr. E. A. Nicol, Bluff, gave a lecture on "Whaling."

Eastern Southland.

Crookston.—Arrangements made for a debate with the Waikaka Club. I. Adam and A. Smith, who represented the club at the Dunedin Educational Week, gave talks on their experiences. At previous meetings Mr. C. V. Dayus, Department of Agriculture, gave a lantern lecture on "The Care of Breeding-ewes," and Mr. W. Faithful, Department of Agriculture, gave a talk on "Hay and Ensilage Making."

Moa Flat.—Arrangements for further football matches with Roxburgh and Crookston Clubs. Lecture by Mr. John Hodgkin on "The Balancing of Rations for Winter Feeding of Sheep."

South Otago.

Clinton.—Lecture by Mr. G. McDonald, Veterinarian, on "Internal Parasites of Horses and Sheep, their Control and Treatment." At the previous meeting an address was given by Mr. S. D. Blomfield on "The Ingredients of Different Kinds of Fertilizers."

Lawrence.—Discussion regarding broadcast talk over 4YA. It was decided that the subject of the talk should be "The History and Development of Farming in the South Tuaepeka District," and that G. Crump should be the speaker.

Milton.—Talk by Mr. J. Gray entitled "World Affairs."

Stirling.—Address by Mr. N. McDonald, Supervisor to the Otago-Southland Pig Council, on "The Production of Porker and Baconer Pigs for Export." The speaker also gave a short talk on his recent trip through the North Island.

Otago Central.

Alexandra.—Mr. A. C. Cameron, Dunedin, exhibited some interesting films, and also delivered an address on "The Marketing of New Zealand Produce in England," including the daily routine at Smithfield Market, &c. He showed his audience some of the advertisements appearing in England for New Zealand butter and cheese. Arrangements were made at this meeting for the district football tournament.

Arrowtown.—Club debate, the subject being "Grass Farming v. Mixed Farming." Speakers were C. Allan, M. Hansen, J. Beaton, and A. Robins (grass farming), and H. Grant, T. Toll, J. Grant, and J. Brown (mixed farming). The judge, Mr. W. P. Saunders, gave the award to the former team. At the conclusion of the debate an interesting discussion on "Horses v. Tractors" took place. At the previous meeting the Chairman, H. W. Perriam, gave talks on "Electric Fences" and "Early Days in Central Otago."

Roxburgh.—Evening devoted to impromptu speeches, and a report by Ian Kingston, who attended the Dunedin Educational Week.

Upper Clutha.—Lecture by Mr. A. Forrester on "Hogget Mortality and other Seasonal Diseases."

Dunedin.

Palmerston South.—Three members who attended the Dunedin Educational Week gave reports of their experiences. At this meeting a presentation was made to a club member who was about to be married. At the previous meeting a debate was held in preparation for the debate with Hampden Club; the subject was "Mixed Farming v. Specialized Farming."

South Taieri.—The District Secretary, Mr. S. H. Saxby, Department of Agriculture, addressed the members, and pointed out that the Department was arranging for the exhibition of a series of "talkie" films throughout Otago, and indicated the type of pictures that would be shown. He also referred to the Y.F.C. column in the *Otago Daily Times*, which is available for the dissemination of club news. He invited members to send in short paragraphs of interest, and stated that preliminary notices of club meetings could be written up for the column if secretaries would supply him with the information the week before the notice was to appear. Members of the Farmers' Union then joined the meeting, and Mr. Saxby gave a lecture on "The Purchase of Farm Seeds."

North Otago.

Duntroon.—Lecture by Mr. C. R. Stringer on "The History of Fertilizers."

Enfield.—Discussion regarding annual social; fancy-dress ball proposed. Donation towards Far East Relief Fund. Letter from Toc H re Christmas Treat for Otekaieke Special Boys' School. Lecture by Mr. J. T. Kibblewhite on "Shelter-belts and Plantations."

Five Forks.—Club debate on the subject "Is Modern Civilization a Failure?" Speakers: A. Heron, P. Cooney, and A. Ellis (affirmative), and J. Rutherford, T. Hogg, and W. Kingan (negative). The negative side won by a narrow margin, T. Hogg and W. Kingan being adjudged the best speakers. Mr. Austin acted as judge.

Tokaraki.—Lecture by Mr. C. R. Stringer on "Fertilizers and Top-dressing."

Upper Waitaki.—Lecture by Mr. J. T. Kibblewhite on "Tree Planting."

Waitaki-Hilderthorpe.—Lantern lecture by Mr. B. B. Blackmore on "Champion Cattle of Australia, United States of America, and Great Britain." At the

previous meeting a lecture was given by Mr. C. R. Stringer on "The History of Fertilizers."

South Canterbury.

Arno.—An address by Mr. A. M. Patterson entitled "Do's and Don'ts in Agriculture." At the previous meeting two debates were held, the subjects being as follows: For the juniors, "Does Agriculture offer as Good an Opportunity to Young Men as other Employment?" the result being a tie; for the seniors, "Should the New Zealand Government encourage Immigration from other Parts of the British Empire at the Present Time?" the affirmative supporters being the winners. Messrs. H. Meredith and I. Ross acted as judges for the junior and senior debates respectively.

Geraldine.—Final arrangements for dance; lively discussion on a paper entitled "Ewe Management," obtained through the W.E.A. box scheme. At the previous meeting an interesting talk was given by H. Worner, a club member, on "The Electric-light Bulb."

Hunter.—Arrangements for debate with the Waihaorunga Club. A club debate was held, the subject being "That an Extension of Secondary Industries in New Zealand is Desirable." The speakers for the affirmative, D. Gregan, J. Geaney, and M. F. Scott, were adjudged the winners. Mr. A. M. Patterson acted as judge, and gave members some very helpful advice. At a later meeting Mr. A. Grant, Department of Agriculture, gave an address on "England and Scotland," describing the surface features, the climatic conditions, and the methods and habits of the rural people of both countries.

Maungati.—Club debate, "That the Young Farmer of To-day has Greater Opportunities than his Grandfather." The affirmative supporters were adjudged the winners, Mr. B. E. Evans and Mr. Cookson acting as judges. At the previous meeting an address was given by Mr. R. B. Steele, of the Canterbury Education Board, on "Trees and Shelter-belts on Farms."

Pleasant Point.—Arrangements for club field-day. Decided to donate 10s. 6d. for two special prizes at the forthcoming flower show. Impromptu speech competition held; a list of subjects, mainly on farming topics, was prepared and numbered. As each member's name was drawn from a hat he chose a number, and then spoke for two minutes on the subject corresponding. The competition, which proved very entertaining, was won by W. Skinner. At the previous meeting a lecture was given by Mr. E. J. Lukey, Government Veterinarian, on "Diseases of Sheep."

Southburn-Lyalldale.—Arrangements for annual dance. Club debate, "That a Young Farmer of To-day has Greater

Opportunities than his Grandfather"—speakers: K. Caird, P. Parry, W. Kinross, and R. Parry (affirmative); and T. Toohey, A. Copland, and J. Stowell, jun. (negative). At previous meetings lectures were given by Mr. C. C. Leitch, Department of Agriculture, on "Grass and Clover Certification"; Mr. Grant, Department of Agriculture, on "Sugar-beet Growing"; and Mr. A. Copland, Public Works Department, on "Irrigation."

Mid-Canterbury.

Hinds.—Lecture by Mr. T. K. Ewer, Veterinary Research Officer, Ashburton, on "Diseases in Sheep."

Mayfield.—Short talks by members as follows: E. H. Mulligan, on "Gorse Control"; K. Moore, on "Rugging of Sheep"; A. McLay, on "Snow, and the Difficulties in Feeding Stock"; H. Oakley, on "Top-dressing"; R. M. Mulligan, on "Tonics for Sheep"; G. Rushton, on "Header Harvesters"; D. B. Mulligan, on "Eradication of Twitch." A debate was also held, the subject being "Road v. Rail Transport." The speakers were T. R. Mulligan and K. Moore (road); and W. L. Doyle and D. B. Mulligan (rail). The road-transport supporters were declared the winners by one vote.

Methven.—Address by Mr. R. J. Low on his recent trip to Australia.

Christchurch.

Darfield.—Arrangements for football match with Ellesmere Club and fat-lamb judging at the Courtenay A. and P. Show. Team to be sent to take part in stock-judging at Christchurch Show. Debate with Farmers' Union, the subject being "That the Young Farmers of To-day have Fewer Opportunities than the Young Farmers of 1910." Speakers: H. Evans, J. Green, H. Bedford, and R. Fechneg (Y.F.C.), and G. Buttle, F. Crompton, J. Symes, and J. Pullen (Farmers' Union). The Farmers' Union team won by one point.

Dunsandel.—Address by Dr. Frankel on "Russia."

Ellesmere.—Accepted challenge from Darfield Club to a debate. Arrangements for football match with Darfield. Donated 10s. 6d. to Ellesmere A. and P. Association in appreciation of use of room for club meetings. Two members who took part in the Canterbury Y.F.C. tour of the North Island, R. Lilley and K. McGill, gave talks on their experiences. Address by Mr. W. McIntosh on "The Pig Industry and the Pig-club Movement."

Ladbroke.—Arrangements for football match with Springton Club, annual ball, &c. Talks by Messrs. Black and Thomson, of the Agronomy Division, on "The Work of the Agronomy Division" and "The Production of Pure Seed

Potatoes" respectively. At the previous meeting two club members, A. Coleman and Alex Webley, spoke on "Ploughing Problems" and "Some Experiences at Sea."

Little River.—Lecture by Mr. C. W. Humm on "Herd-testing and Top-dressing; their Influence on Herd-production."

Springston.—Address by Dr. I. W. Weston, Lincoln College, on "The History and Economic Development of the Springs County." At the following meeting a debate with the Farmers' Union was held, the subject being "That Pastoral Farming is better than Mixed or Agricultural Farming." R. Harris and I. Oldman (for the Y.F.C.) took the affirmative, and were adjudged the winners against Messrs. A. E. Payne and F. Tyson (for the Farmers' Union).

Teddington.—Talks by club members—P. de Pass spoke on the short course at Lincoln College, and T. E. Streeter and D. Miller gave their experiences while on the Canterbury Y.F.C. North Island tour.

North Canterbury.

Amuri.—Lantern lecture by Mr. A. S. Nash, Department of Agriculture, on "Liming in Canterbury."

Cust.—Discussion regarding field-day and dog-trials. Captain McIntosh (Kaia-poi) and Mr. R. Myers (Oxford) gave a brief outline of the C.V.C., and stressed the need for recruits. An interesting talk on "The Training of Dogs" was given by Mr. Leslie, a club member. At the previous meeting Dr. M. J. Franklin, Lincoln College, gave a lecture on "Parasites in Sheep." Committee elected to work in conjunction with the Farmers' Union and W.D.F.U. to arrange for the annual ball.

Hawarden.—Arrangements for dance. Members present drew from a hat subjects dealing with some phase of farm-management, each to prepare a five-minute talk for the next meeting. Lantern lecture by Mr. A. S. Nash, Department of Agriculture, on "Lime and Liming."

Scargill-Omihi.—Arrangements for club ball. A film depicting modern tractors and machinery was exhibited before an audience of club members and farmer friends.

Marlborough.

Blenheim.—Talks by club members—A. Middlemiss, F. Lucas, and J. Neal ("The Wellington Educational Week"), and W. Walsh ("Canterbury Ploughing Matches"). At the previous meeting Mr. G. C. Wastney gave an interesting talk on a wireless transmitter and receiver.

Ward.—Club debate, "Blade Shearing v. Machine Shearing," the speakers being G. McNabb, D. Johnston, W. Bowers, and R. Sharpe (for the blades), and L. Butt,

A. Wooding, D. F. Matthews, and J. Hickman (for the machines). The debate resulted in a win for the blades supporters by one point.

Nelson.

Dovedale.—A post-mortem examination of the recent debate between Dovedale Club and the Farmers' Union (reported in these pages in the August issue of the *Journal*) was conducted by Mr. E. J. Thompson, who judged the debate. This proved of great value to members. At a previous meeting Mr. Fowler gave a talk entitled "The Combined Forces Tattoo," dealing with his recent trip to Australia with the New Zealand Contingent of ex-servicemen. A club field-day was held on Mr. C. Silcock's property at Thorpe, taking the form of dog trials and dog show. In the trials, the heading event was won by I. Win's "Glen," and the huntaway by R. Silcock's "Jock." In the show for smooth-coated dogs, the male class was won by K. Burnett's "Jock," and the female class by P. Burnett's "Alert." The Championship Cup in the trials was won by I. Win. A successful social and dance was held in the evening.

Moutere.—Arrangements for a debate with the Farmers' Union. Club members who attended the Wellington Educational Week gave talks on their impressions and experiences. C. Newport, a club member, gave a lecture on his tour of the North Island. At the previous meeting Mr. Davies, of the Cawthron Institute, gave a talk on the work of the Institute.

Manawatu.

Apiti.—Lantern lecture by Mr. L. W. Gorman, Plant Research Institute, on "Crains in Pasture Plants."

Colyton.—Practice debate to select a team to take part in the district debating contest. Mr. G. Crossley, Palmerston North, gave some very helpful advice on debating, and at the conclusion selected the team. Arrangements were made for a concert and dance.

Fitzherbert.—Debate in the Linton Hall between the Kairanga and Fitzherbert Clubs. After summing up, the judge, Mr. Edwards, Palmerston North, declared Fitzherbert the winners by 233 points to 199.

Halcombe.—Team selected for debate with Kimbolton Club. Mr. Belgrave gave a talk on "The Plough," dealing mainly with the construction of a plough and how to set it correctly.

Johnsonville.—The organizing Secretary, Mr. S. Freeman, addressed the members on the organization generally, and exhibited some interesting "talkie" films. A successful dance was recently held by this club, the profit of £6 17s. being made up to the sum of £7 and forwarded to the Hawke's Bay Flood Relief Fund.

Kairanga.—Discussion regarding euchre evening and dance. Debate between

three members of the Linton Club and three members of the Kairanga Club, the subject being "That Women of To-day should take Part in the Industrial Life of the World." The judge, Mr. G. Crossley, gave his decision as a draw. Some interesting films on farm tractors were exhibited by Mr. T. Kidd.

Kimbolton - Kiwitea.—Debating team selected to meet Halcombe Club. Lecture by Messrs. A. F. Clarke and A. C. Morton, Massey College, on "Wool."

Levin.—Club field-day arranged. Lecture by Mr. Bradfield on "Shelter-trees."

Oroua Downs.—Lantern lecture by Mr. E. E. Elphick, Government Veterinarian, on "Stock Troubles and Ailments."

Otaki - Te Horo.—Lantern lecture by Mr. E. Bruce Levy, Director of Grasslands Division, Plant Research Bureau, on "Impressions of Agriculture Overseas." Members of the Farmers' Union and Rahui Supplies Association were invited to this meeting, and an attendance of approximately seventy was recorded.

Pohangina Valley.—Arrangements for dance and field-day. Selection of debating team. Trial debate, "That Farming To-day is more Difficult than it was Fifty Years Ago." Speakers: A. MacDonald, D. Turnbull, and J. Howell (affirmative), and J. Linklater, M. Fitzherbert, and R. Smart (negative). The debate was won by the affirmative.

Rangiwahia.—Lecture by Mr. G. S. Robinson, Department of Agriculture, on "Certified Seeds."

Shannon.—Address by Mr. C. Joy on "Experiences at Sea."

Woodville.—Mr. A. F. Curry, Woodville, gave an instructive talk on "The Handling of a Young Dog." At a later meeting a debate was held between teams representing the Pohangina Valley and Woodville Clubs. The debate was won by the Pohangina Valley team.

Wairapa.

Ballance.—Lantern lecture by Mr. N. Lamont, Department of Agriculture, on "Common Pests"; slides were shown depicting the life-cycles of the white butterfly, diamond-back moth, and grass-grub. Arrangements were made for a dance to wind up the series of club euchre parties.

Carterton.—Arrangements for debate with Martinborough Club, and also a dance. Lantern lecture by Mr. N. Lamont, Department of Agriculture, on "Common Pests." At the previous meeting a club debate was held, the subject being "Town v. Country Life." Speakers: A. Fisher, P. Swinn, and F. Ward (town), and J. Milne, C. Bliss, and N. Palmer (country). The town supporters won by a small margin. Mr. E. Fisher acted as judge. A field-day was also held at the Wairapa Training-farm, the manager, Mr. N.

Blatchford giving demonstrations on the handling of a young horse and the setting and working of a plough. The farm pastures were also inspected.

Eketahuna.—A very successful "Question Evening," was held, practically all members taking part in discussion.

Greytown.—Field-day at Masterton. Visits to W.F.C.A. granary and meal-mill, and Messrs. Wright, Stephenson's seed-dressing plant in the morning; in the afternoon the members visited the property of Mr. L. T. Daniell and were given a demonstration of an electric fence. Mr. Daniell's up-to-date cowshed was also inspected.

Martinborough.—Arrangements for field-day and also debate with the Carterton Club. Lantern lecture by Mr. N. Lamont on "Some Common Insect Pests."

Masterton.—Final arrangements for annual ball. Lecture by Mr. M. Davey, Department of Agriculture, on "The Establishment and Maintenance of a Homestead Orchard." Mr. Davey dealt with the planning of the orchard, the selection of trees, pruning, pests, spraying, &c.

Pongaroa.—Arrangements for a dance. Lecture by J. Mitchell, a club member, on "Soil Fertility," dealing with top-dressing, manuring, soil deterioration, &c. The lecture was considered by the members to be one of the most interesting and instructive that they had heard.

Tinui.—Lecture by Mr. M. Davey, Department of Agriculture, on "The Establishment and Maintenance of a Homestead Orchard."

Southern Hawke's Bay.

Norsewood.—Arrangements for dance. Lecture by Mr. A. D. M. G. Laing, Government Veterinarian, on "Mammitis and other Diseases."

Takapau.—Arrangements for a debate. Combined meeting of the W.D.F.U. and Y.F.C. to listen to an instructive address by Miss Kohn, Dannevirke District Nurse, on "District Nursing."

Northern Hawke's Bay.

Nuhaka.—Discussion regarding stock-judging at the forthcoming A. and P. Show. Club debate, "Subterranean Clover v. White Clover." C. Clayton and J. G. McIntyre took the lead for the subterranean and white clover, respectively, the judge, Mr. Tod, giving the decision to the supporters of subterranean clover.

Poverty Bay.

Te Karaka.—Discussion re sports programme. A. Manuel and R. Jackson spoke about their visit to Wellington for the Educational Week.

Tolaga Bay.—Debate with a team from the Tolaga Bay High School, the subject being "Root-crops v. Hay for

Supplementary Fodder." Speakers for the Y.F.C. were J. Irving, M. Robison, and C. O'Connell.

Wanganui.

Bulls.—Field-day arranged. Lecture on "Romney Sheep" by Mr. H. B. Johnston.

Marlon.—Lecture by Mr. G. A. Harris on his experiences during his recent European tour. Field-day on Mr. J. Brice's property; judging competition on Romney sheep, and demonstration on Hereford cattle by Mr. W. H. Morton.

Waimarino.—Arrangements for field-day and debate. Lecture by Mr. H. E. Frederick on "The Construction and Working of a Threshing-mill." At the previous meeting a lecture was given by Mr. J. H. Claridge, Seed Certification Officer, Wellington, on "Potato Varieties."

Westmere.—Arrangements for field-day and also a dance. Lecture by Mr. C. J. Hamblyn, Department of Agriculture, on "Subterranean Clover." A field-day was held on Mr. B. Dawes' property, Westmere. Mr. W. Harris, Inspector of Stock, spoke on "Calving Difficulties," and also conducted a post-mortem examination of a cow.

South Taranaki.

Alton.—Lecture by Mr. R. E. Alexander, Government Veterinarian, on "The Microscope." Debate, "Is Country Life better than Town Life?" The judge, Mr. A. Ivey, gave his decision to the town supporters.

Eltham.—Discussion on club affairs. Talk by Mr. H. D. Lambie on the recent tour of the South Island undertaken by Taranaki Club members. Mr. Lambie, who is Vice-President of the South Taranaki District Committee, was in charge of the touring party. This is a newly formed club with very good prospects.

Hawera.—Short talk on farming subjects by M. Bain, E. Gane, P. Heise, G. Kavanagh, J. Johnson, and W. Phillips, all club members. At previous meetings a talk was given by Mr. P. O. Veale, Club President, on "The Art of Speech-making"; and a discussion was held on a report on "Land-settlement" by E. Gane and W. Phillips (club members).

Kaponga.—Return euchre match arranged with Cardiff Club. Lecture by Mr. A. O'Sullivan on "Pigs and their Management." At the previous meeting Mr. F. Rodie gave a lecture on "Sheep."

North Taranaki.

Cardiff.—Challenge from Toko Club to football match accepted. Report on euchre matches with Kaponga and Pukengahu Clubs, both of which were

won by Cardiff Club. Lecture by Mr. G. A. Blake, Department of Agriculture, on "The Breeding and Management of Pigs."

Karawaka.—Lecture by Mr. D. Hull, Dairy Instructor, on "Feed Flavours in Milk and Cream."

Okau-Tongaporutu.—Discussion on club activities. Addresses by Messrs. G. A. Blake and A. G. Elliott, Department of Agriculture, on "Fencing and Pig Lay-outs" and "Debates on Farming Subjects," respectively; talk by Mr. J. B. Carr on "How to Conduct a Meeting."

Toko.—Arrangements for dance. Talk by Mr. Scherer on "Experiences in America."

Urenui.—Field-day to be held. Messrs. A. G. Elliott and G. A. Blake, Department of Agriculture, addressed the meeting. Mr. Blake explained the benefits of Y.F.C. stock-judging competitions, and Mr. Elliott spoke on the farm competitions in the Urenui district. This is a newly formed club with very good prospects.

Te Kuiti.

Te Anga Central.—Football match arranged with Otorohanga Club. R. E. Miln, club representative on the Auckland Council, spoke about the recent inaugural meeting of the Council. Mr. K. M. Montgomery, Department of Agriculture, spoke about club activities generally.

Waikato.

Te Kowhai.—Committee set up to organize a field-day. Mr. Knight, of the Herd-testing Association, gave interesting talks on "Statistics in Connection with Disease and its Effects on the Dairying Industry" and "Sire Survey from a Butterfat Production Viewpoint."

Rotorua.

Horohero.—Report on recent tour to Waikato district. Discussion regarding holding of ploughing match, securing of suitable ground, &c.

Putaruru.—Lecture by Mr. H. Wood-year-Smith on "Soil Erosion."

Eastern Bay of Plenty.

Edgecumbe.—Report on dance, which had proved successful both financially and otherwise. Debate at Taneatua with the Waimana Club, the subject being "That All-the-year-round Dairying is more Profitable than Seasonal Dairying." The debate resulted in a win for the Waimana team, which took the negative side. The Edgecumbe team was as follows: F. E. Beggs, R. Strachan, J. Murray, and J. Tollemache. Mr. M. Mead, Taneatua, acted as judge.

Opoiki.—Selecting of team for district debating contest.

Waimana.—Practice debate in preparation for second round of district debating contest. Subject: "That the Present-day Young Farmer has Greater Opportunities than his Grandfather." R. Woolfield was the leader on the affirmative side, and H. White on the negative. The judge, Mr. N. Macdonald, gave his decision as a draw.

Western Bay of Plenty.

Katikati.—Arrangements for combined dance with the W.D.F.U. Debate to be arranged with the Katikati branch of the W.E.A. Lantern lecture by Mr. C. R. D. Taylor, Department of Agriculture, on "Hay and Ensilage."

Omokoroa.—Lantern lecture by Mr. C. R. D. Taylor, Department of Agriculture, on "Hay and Ensilage."

Paengaroa.—Arrangements for complimentary birthday party. Presentation to Mr. H. Mohr, who is leaving the district. Mr. Mohr was the club's first secretary, and has proved himself a keen and conscientious member. Two practice debates were held, as follows: "That Industry in New Zealand should be confined to the Production of Foodstuffs and Raw Materials for Overseas Markets," and "That Horses are Better than Tractors for Farm Work." Mr. K. Chapple acted as judge. A field-day was held on Mr. Marcus Wilkins' farm, Maniatutu Road, and took the form of an inspection of shelter-belts, ensilage-pit, pumping-outfit, water-supply, lucerne-hay shed, and a demonstration by Mr. Wilkins on the making of concrete posts.

Waihi.—Business meeting; debates, &c., arranged

North Auckland.

Broadwood.—Lecture by Mr. Beattie, Supervisor of the Northland Pig Council, on "Pigs and Pig-feeding."

Marohemo.—Members who attended the Y.F.C. Week at Ruakura Experimental Farm gave their impressions and experiences. At the previous meeting a lecture was given by Mr. Beattie, Supervisor of the Northland Pig Council, on "Better Pig Production."

Matarau.—Club debate, the subject being "That Rearing your own Stock is better than buying Outside Blood." At the previous meeting a lecture was given by Mr. T. H. Hankin, Government Veterinarian, on "Calving Troubles." The difficulties met with at calving and the troubles associated with the newly calved cow were dealt with explicitly and thoroughly. A good attendance was recorded.

Oruru.—Election of delegates to Council. Lecture on "Pigs and their Management" by Mr. Beattie, Supervisor of the Northland Pig Council.

Health Notes for the Farm.

Contributed by the Department of Health.

Prevention of Coughs and Colds.

What is it that moulds the life of man ?
The weather.
What makes some black and others tan ?
The weather.
What makes the Zulu live in trees,
The Congo natives dress in leaves,
While others go in furs and freeze ?
The weather.

ONE of the most common topics of conversation is the weather, especially when it is changeable or disagreeable. We are "weather-conscious," particularly when we hear a broadcast that "a deep depression is rapidly advancing across the Tasman Sea." Then we often have a vague idea when the deluge descends that it has been raining for a week and that atmospheric depressions have been the lot of New Zealand for a month.

On this gloomy attitude of mind an essayist writes: "I can well imagine that when some heavy misfortune befalls a man he soon begins to feel as if it had befallen him a long, long time ago; he can hardly remember days which were not darkened by it; it seems to have been the condition of his being almost since his birth. After heavy rain has fallen for four or five days all persons who do not keep diaries invariably think that it has rained for a fortnight. If keen frost lasts in winter for a fortnight, all persons without diaries have a vague belief that there has been frost for a month or six weeks."

Effect of the Weather.

However this may be, we do speak of winter colds, spring fever, and summer complaints, showing that it is a common idea to connect the weather or the temperature with certain types of illnesses or indispositions. But does the weather really have an effect upon one's health? The answer is emphatically "Yes."

It is a well-established fact that at the change of seasons, with the invariable sudden fluctuations of temperature, there are an unusually large number of colds and other respiratory disorders, and therefore the time seems opportune to discuss that arch-enemy of human life—THE COMMON COLD. During the bleak winter months it stalks abroad on its evil mission, and soon we are made aware of its undesirable presence by the pathetic victims in the trains, the office, the factory, and the home.

The difficulties of preventing colds are great, for do not doctors, nurses, and even Health Department officials suffer just as other people? However, it must be recognized there is no need for colds to be as prevalent as they are, and there are principles of healthy living which will, in many instances, protect us from an attack.

Not a Trifling Complaint.

The common cold itself is often universally considered so trifling that vigorous individuals often do not permit the disease to hamper their daily pursuits and treat a cold as something to be shared. The result is that colds usually go through families, schools, and business groups, and rapidly become scattered in many different small epidemics throughout the community. The economic consequences are considerable in that an enormous number of people who acquire this disease lose efficiency for a short time, and this minor malady becomes one of grave importance.

Many will agree with the person who wrote: "For myself, I always was indignant when people with colds come to me, and, in effect, say—'Silver and gold have I none, but such as I have, give I thee,'—and then give me their

beastly malady." And further: "One reason for our refusal to isolate ourselves when we have a cold is that it is supposed to be a relinquishing of our duty. Our duty, apparently, is to infect other people or, if we do not think that, then we must suppose that our presence at a gathering is so desirable that every one would prefer to catch cold than suffer from our absence, or our charm is too great that without us it would be the play without Hamlet. For myself, I would sooner see the greatest lion of society sent to Timbuctoo than be bathed in his sneezes."

However, when the condition is mild it is sometimes better to let a person remain at work with peace of mind than to compel him to remain at home in a state of anxiety.

Neglected Colds.

The risks of neglected colds are twofold—to the individual and to the community. In the first place, there is danger of the cold producing more serious infections, such as bronchitis, laryngitis, and broncho-pneumonia. Secondly, during the course of the condition, by sneezing, coughing, and spitting, there occurs an indiscriminate scattering of germs.

There are two kinds of common colds—the colds caught from other people and those contracted even though colds are not prevalent in the population. People who have adenoids or diseased tonsils or are run down are likely to have either kind. In some cases the susceptibility to colds is due to abnormalities in the nose or throat. Those who suffer from recurrent colds should take the precaution of having the nose and throat carefully examined and having abnormal conditions corrected.

Early Care Essential.

Very few colds would develop into serious illness if the person who had the cold were wise enough to take proper care of himself the first day or two. Rest in bed, if possible, or at least indoors, is advisable if the victim feels weak, as weakness may be a sign of influenza. A laxative should be taken; in many illnesses we seem to manufacture poisonous products in our digestive tract, and if these toxins are not cleared out they give trouble.

One should not rely on a bottle of medicine as a sure and certain cure. These things are, no doubt, well enough in their place, but we must not get into the way of relying upon these remedial agents. Breathing steam or using a mild salt-water douche, if medically advised, may relieve the stopped-up feeling. A hot bath before going to bed is recommended. The patient should take plenty of hot drinks, such as hot lemon drink.

Blowing the Nose.

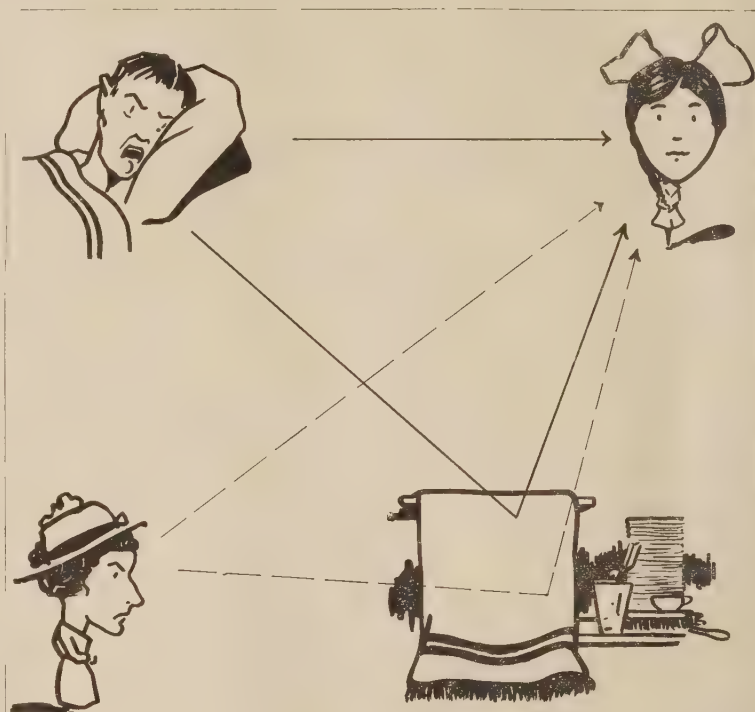
During a cold it is important to warn the patient not to blow both sides of the nose at the same time as infection may be forced into the middle ears. If fever occurs with the general symptoms of a cold and the back and legs ache badly influenza is probably indicated, and medical advice should be sought. These cases need careful nursing, absolute rest, physical and mental, and correct feeding.

If a child has a cold it is safest to keep him in bed for a few days until the acute stage is past. Neglected common colds in young children have been known to be the forerunner of pneumonia. Bronco-pneumonia carries off many children whose lives might have been spared by timely advice and treatment by the family physician. This question of putting a child to bed may seem difficult to manage, but it has saved numberless children from the diseases mentioned.

Prevention.

In the first place, it might be stated that sustained good health is encouraged by a courageous attitude towards life. "Fear and be slain" is as true of health as of the adventurous life. However, if gargling, mouth washes, and the saturation of the handkerchief with eucalyptus and the like helps to give confidence there is no harm in employing them. If they enable an individual during an epidemic of colds or influenza to step fearlessly into a train or tram they may serve some purpose.

Colds are frequently transferred to children by inconsiderate people, perhaps



Method of Transmission of ACUTE RESPIRATORY DISEASES COLDS, INFLUENZA, PNEUMONIA &c

[—Overton and Denno.

friends or relations of the family, who cannot abstain from visiting when suffering from infection themselves, or, what is still worse, fondle and kiss a healthy child, thus spreading disease and endangering life, for colds are catching—catching in the same way that measles and whooping-cough are catching

Exposure to Infection.

It is also undesirable to expose infants and children of tender years to the risk of lowering their resistance to disease by keeping them out late in the afternoon or at night during cold, wet winter days and also by taking them into crowded places. One witnesses too many instances of this in our cities. Thus are the seeds of tuberculosis and pneumonia often sown.

Young children, who are scarcely formed or moulded, need adequate sleep and bodily and mental rest. They are denied those vital essentials to healthy growth if they are kept out too late at night and allowed to frequent crowded places. The majority of parents realize this, but some do not, or they must be

indifferent to the supreme needs for the healthy growth of their children. Crowding and close personal contact spread common colds.

Moderate Temperature in Rooms.

It is most important to keep the rooms of the house at a moderate temperature. Hot rooms encourage the growth of germs. Have you ever noticed a ray of sunlight slanting across a room through a slit in the curtains? If so, you will remember how it shows up dust floating in the air which in ordinary light you do not see at all. Few people when they see this can resist saying: "Goodness, who would have thought there was all that dust about!" We forget it is always there; the sunlight only happened to show it up.

Can you think of the air as also containing living dust much smaller than this—so small indeed that even in the strongest sun it cannot be seen? When we cough or sneeze we explode a number of tiny drops which float about, and a certain number get breathed in by anybody in the neighbourhood of the sneeze.

If, instead of dust, we think of the germs as things which can multiply faster than any other living thing known if they find the right matter on which to live, then we have an explanation of how colds are caught and spread in hot rooms. In bad weather people tend to close their windows and overheat their rooms, and the consequent stuffiness of the atmosphere lowers resistance and makes people more prone to catch any disease that is about.

Children are, of course, far more susceptible to infection than adults, and their sickness rate would be reduced if windows were kept open day and night and the rooms they occupy were properly ventilated. It is not the engine-drivers and firemen of trains who catch cold, but the passengers in the stuffy carriages. No doubt the drivers of the trams are less susceptible to colds than the conductors, who have to move frequently through the crowded cars.

Efficient Ventilation.

Efficient ventilation is most important. By this is not meant keeping one window open a few inches day and night so that a cold knife of air impinges on some area of the room and hits some one whether asleep or awake, nor is meant keeping many windows always open so that the whole house becomes cold and

every one within it. What is meant is the efficient changing of the air a certain number of times a day while retaining the general warmth of the building. This can be done by establishing a through draught for short periods of time.

However, this problem of adequate ventilation is not always an easy one, but there are rooms in the house that can be well aired during the day. To sit in a cold and dreary house may be a serious matter, and, as in many other matters, moderation should be the aim for the home and place of business.

In shops the problem is particularly difficult, although in modern-constructed shops much has been done to provide efficient ventilation by means of air extractors. In all business there are ebbs and tides when the air can be changed by concerted effort. It should be remembered that good clerical work, for instance, cannot be done by people who are cold, so that the aim should be to keep the rooms at a moderate temperature. Fans are invaluable for keeping the air in motion, which is an important factor in preventing air stagnation.

Protective Measures.

In conclusion, things which tend to promote general health, such as fresh air, exercise, simple foods, rest, moderation, evidently play a part in protecting

the body against such an infectious disease as the common cold. The skin should be trained to stand changes in temperature by frequent bathing. After indulging in strenuous sports a brisk rub down and change of clothing is essential. Sitting about with wet stockings and boots on should be avoided by all. Outer clothing should be adapted to the changes in the weather and medium-weight clothing worn throughout the winter season. So long as the body is warm, cool air is better to breathe than hot air.

Overheated, overcrowded, and badly-ventilated rooms should be avoided. A temperature of about 63° F. is ideal for sedentary occupation, and 60° F. to 62° F. for active indoor occupations. Children should be encouraged when quite young to use a handkerchief regularly and in a proper manner. The nose-passage must always be kept clean, clear, and free from discharge. It is the gate of entry to the lungs. Constipation predisposes to colds, and should be vigorously combated by proper diet, exercise, and regular habits.

If you have a cold, take care of yourself. Go to bed if you feel weak, and cough and sneeze into a handkerchief and so do your best to protect others from infection.

❖ ❖ ❖

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The Farm Home and Kitchen.

Contributed by Department of Home Science, University of Otago.

Good Food Combinations, and Why.

IN the planning of diets a little knowledge is a very dangerous thing, for one of the chief reasons why people accept unscientific theories about the digestibility of certain food combinations is because they do not understand how the digestion of food is carried out. It is proposed, therefore, to give a simple description of how digestion starts in the mouth and is carried on in the stomach, reaches its maximum in the small intestines, where food is also absorbed, and then finishes in the first part of the large intestines. An outline will also be given of all the factors, including wise food combinations, which help to make that digestion easy and complete.

To begin with, what does digestion mean? It means the chemical splitting up of food so that the products made are able to be absorbed through the skin that lines the intestines. A more complete description is that it involves bringing all food into a liquid form, breaking up protein into amino-acids, dividing fat into its two constituents (fatty acid and glycerine), and dividing all carbohydrates, whether starch or sugar, into simple sugars. When this has been done, all these simple substances can pass through the lining of the intestines and enter the blood-stream or the lymph.

Various Processes.

The processes which bring about these changes are partly mechanical and partly chemical. They begin when food is taken into the mouth, and continue in orderly fashion until the products mentioned are absorbed and the refuse eliminated.

The first duty of the mouth is to grind up coarse foods and to soften or possibly dissolve them. If the teeth are missing, soft foods or foods minced or sieved assist in giving some ease in digestion, but where chewing is possible it should be encouraged

by not giving soft or semi-liquid forms of food. The use of hard, crisp food, such as toast and dried bread, compels one to chew well, and by so doing the saliva has a good chance of penetrating the fine particles of the starchy food and not only of softening them, but also of dissolving them.

Digestive juices are enabled to dissolve food because they contain certain chemical substances which the body manufactures in special cells and glands. When the food is there and the conditions are satisfactory, these enzymes, as they are called, split up the proteins fats and carbohydrates into absorbable material.

Splitting up to Units.

The enzymes have been likened to keys, each fitting a single kind of lock, because each of the three classes of food is acted on by a different series of enzymes. Having opened the lock, the key sets free a simpler substance, as if one had a nest of boxes and a key to each, by which the next smaller could be released. Thus, in the saliva we have an enzyme called ptyalin, which can unlock a starch unit, giving maltose, which is a double sugar. This, in turn, must be unlocked by another enzyme to give simple sugar which the blood can absorb and the muscles use as fuel. By means of a nicely adjusted series of enzymes the body is kept from being overwhelmed by a large dose of the kind of food it is trying to use.

The mouth must now be considered in relation to digestion. When starch is taken it is gradually changed to sugar, but it needs to be cooked so that the enzymes can readily attack it, and it also needs to be finely broken up so that the digestive juices can quickly reach every particle. Foods which become pasty in the mouth, such as hot scones,

soggy potatoes, raw unripe bananas, steamed pudding, &c., tend to slip down the throat in lumpy masses, little affected by the saliva, and hard for the juices down the digestive tract to penetrate. This is another reason why baked potatoes and hard, dry foodstuffs are better for a steady diet than the pasty foods just mentioned.

It also influences the cooking of starchy foods. Refined starchy foods, such as arrowroot and cornflour, can be cooked rather quickly, but unrefined cereals, such as oatmeal and nearly all the coarser porridge cereals, have their starch tied up in little pockets of cellulose or fibre, which the enzymes cannot penetrate and which are not usually well broken by chewing. Hence, without long, slow cooking to soften the cellulose walls, much of the starch will fail to digest.

Importance of Chewing.

In addition to being important in helping to grind and soften all hard, coarse food and to digest carbohydrate, chewing is one of the signals to the stomach, preparing it to do its duty. The digestive tract from beginning to end is operated like a complex railway system. Signals are sent ahead and the way prepared for the oncoming food. Hence, chewing assists the ease of the rest of the digestive work.

The stomach is a great reservoir into which food from the mouth quietly settles and is gradually mixed with the gastric juice and the acid of the stomach. The enzyme pepsin then attacks the protein, and for the time being carbohydrate digestion stops. To have good digestion in the stomach one must have a good flow of gastric juice, which depends on many factors, regularity being one. Most people are extremely careless in

this respect, and good food is often blamed for poor results, when irregularity was really what upset the system.

Good mastication has already been referred to. Pleasurable anticipation, due to tempting odours or appearance, will make not only the mouth but also the stomach "water." Further, certain substances, such as meat extractives, as given in soups, stimulates the flow. This is why it is a good thing to begin a meal with a little soup when a person's powers of digestion in the stomach are feeble. This will assist the digestion of the more nourishing food, which must be given next, since there is little fuel value in beef broth.

Influence of Nervous State.

A person's nervous state is very quickly reflected in the stomach. Excitement, worry, anger, chill, and fatigue all tend to retard the digestive process. Persons who are thus emotionally upset should not eat anything except the most easily digested foods. Warm, well-diluted food, such as cocoa, soup, malted milk, or a lightly cooked egg with a little toast, are suitable at such times.

Very concentrated foods may be irritating to sensitive stomachs. For instance, sweets taken on an empty stomach are definitely irritating, as also may be cheese, nuts, or strongly acid fruits. Hence, sweets are best eaten at the end of a meal, and cheese with bland foods that will dilute it, as, for instance, with crackers, or with macaroni or breadcrumbs in macaroni cheese or cheese fondue, &c.

Acid fruits should be diluted either with water or by combination with less highly flavoured foods, as in lemon drink, lemon snow, or apricot tapioca.

Rate of Digestion.

The rate, and therefore often the comfort, of digestion is further influenced by the proportions of proteins, fat, and carbohydrate eaten at a meal. Water passes through the stomach very quickly. Carbohydrates tend to pass out more quickly than proteins, and proteins more quickly than fats. Mixtures of carbohydrates and proteins pass out faster than protein alone, but more slowly than carbohydrate. Mixtures of fat and protein, on the other hand, go more slowly than either alone. The retarding action of fat is an advantage or disadvantage according to circumstances.

If a healthy stomach becomes empty it tends to contract rhythmically, with more or less insistence, producing "pangs of hunger." Its possessor may find himself very uncomfortable between meals, complaining that his food does not "stay by him." He does not need a diet which

relieves the stomach, but rather one that requires some time for digestion, and this can be secured by using more fats.

Such a person, especially if doing out-of-door work, can eat bacon, pies, fish and chips, and so on, without discomfort. A less vigorous person would find such foods delaying digestion unduly. Hence, they are usually, and very properly, considered hard to digest. The same is true of other foods where a considerable amount of fat is intimately mixed with proteins or even with carbohydrates, as in pork, rich sauces, suet puddings, &c.

Next Stage.

When a portion of the food has been thoroughly mixed with acid and gastric juice and is ready for the next stage of digestion the muscle around the opening of the lower end of the stomach lets small spurts of material containing food in various stages of digestion enter the small intestines. Here the food meets enzymes, which are far stronger and greater in number than anywhere else in the entire digestive tract.

The stomach send messages to the pancreas, which pours out a fluid with enzymes for digesting protein, carbohydrate, and fat, and cells in the walls of the intestine itself give out a secretion containing enzymes, which break up the double sugars into simple sugars and complete the protein digestion, releasing the amino acids. The bile flows down into the small intestines, too, and makes conditions favourable for these changes and especially for the digestion of fat. The small intestine possesses two types of movement. By one the food is churned and mixed with the digestive fluids, and is brought into contact with the tiny finger-like projections on the intestinal walls which absorb the digested material and start it on its way to nourish the body. By the other movement, the food is pushed along.

Favourable Conditions Required.

For good health in the intestine one requires good conditions in the stomach. Hence, it is fortunate that the stomach is sensitive to bad feeling, and so protects the more important intestinal tube. Emotional conditions affect the intestine as much as the stomach. Although the acid of the stomach acts as a disinfectant, bacteria thrive in the small intestine, and where the food is not absorbed at the normal rate they are likely to use it for their food. Thus, carbohydrates may ferment, producing troublesome gases and irritating acids, and proteins may putrify, forming products even more harmful than those given by carbohydrates.

If it should happen that intestinal digestion is weak, a reduction of the

quantity of protein and carbohydrate foods will lessen the dangers of putrefaction and fermentation, but the better way is to be careful about mastication and the choice of the form in which the food is eaten, because, as already explained, if the food is properly ground up in the mouth the juices get into it easily and digestion is more rapid. Further, the normal peristaltic, or food-propelling, action should be stimulated. This is essential, too, for the health of the large intestine, into which the food now passes.

Final Stages Reached.

By the time the large intestine is reached the material is practically all digested and the part usable by the body has been almost completely absorbed. The contents are held at the beginning of the large intestine for some time so that digestion and absorption are completed, and are then passed along, becoming more solid until they are ready to be evacuated.

It is most important that the movements in both large and small intestines should be normal. If they are too rapid digestion is left incomplete and the body loses valuable food material; if they are too slow waste material accumulates, mechanically irritating the intestinal wall and neighbouring parts. Bacteria prey upon it, and opportunity is given for the absorption of any poisons they produce.

Effect of Civilized Life.

Civilized life tends to hinder the peristaltic, or the food-propelling, motions of the muscles of the intestines—partly because of decreased activity of our abdominal muscles, and partly because food is so frequently refined or overcooked that it leaves no fibrous residue to give bulk. Some bulk is necessary for the intestinal muscles to exercise against. Hence, the diet should include foods rich in cellulose, such as celery, cabbage, and cereals, from which all the bran has not been removed, and in cases of chronic constipation other treatments must also be given.

It will be seen, then, that for good digestion we should plan meals that combine a considerable range of foods—some to encourage complete mastication, such as crisp, starchy foods; some to stimulate gastric secretion, such as meat extractives; some to give colour and attraction to the meal for the same reason; some to give bulk; some to dilute the more concentrated foods; and some to speed up digestion, or possibly some to slow it down. In addition, we have the problem of selecting the foods which, when digested, will give us 100 per cent. nutriment.

Recommended Recipes.

Savoury Eggs.

Method.—Remove the shells from hard-cooked eggs and cut in halves crosswise. Remove the yolks and mix them with the desired seasoning or flavouring agent, together with sufficient melted butter, cream, salad dressing, or tomato or chili sauce to make the yolk mixture tasty. Stuff the white egg cases with the mixture, place in a small lettuce-leaf, chill, and serve.

Suitable stuffing combinations are—

- (1) One tablespoon chili-sauce, and a few drops of onion-juice.
 - (2) Three boned and shredded anchovies, half a teaspoon minced parsley, and one teaspoon of chow-chow.
 - (3) One tablespoon of finely minced ham or tongue, half a tablespoon tomato catsup or mayonnaise, and celery salt.
 - (4) One tablespoon of grated cheese, one tablespoon Worcester sauce, and one teaspoon minced celery.
- These quantities may be used for three eggs.

Canapes.

These are made from stale white bread cut in slices about $\frac{1}{2}$ in. to $\frac{3}{4}$ in. thick and then cut in fingers or shaped with a cutter to form circles, hearts, rings, &c. These pieces of bread may be treated in various ways—fried in deep fat and drained on white paper, or sautéed in butter just enough to colour them lightly. They may be toasted or baked in the oven until brown on both sides. They are then ready to be covered with a savoury spread.

They may play a part in the decoration of a table, and so must be tastefully arranged and garnished with slices of hard-boiled egg, slices of tomato, radishes, cucumber, gherkins, capers, parsley, &c.

Scotch Woodcock.

Egg yolks, 2.
Anchovy paste.
Buttered toast.
Milk, $\frac{1}{2}$ gill.
Salt.
Pepper.

Method.—Make the toast and butter it, and spread it with a thick layer of anchovy paste. Keep it hot. Beat yolks of the eggs, boil the milk and add it to

the yolks, season, and stir over the fire till thick, but do not let it boil. Pour over the toast, and serve.

German Apple Pie.

Filling.

Apples, 2 lb.
Dates, $\frac{1}{2}$ lb.
Sugar, 2 tablespoons.
Butter, 1 oz.
Cinnamon, 1 teaspoon.
Ginger, $\frac{1}{2}$ teaspoon.
Water, $\frac{1}{4}$ cup.

Method.—Peel and core apples, cut in pieces, add other ingredients, and stew until soft in the water. Beat thoroughly, and allow to cool.

Paste.

Butter, 4 oz.
Sugar, 2 oz.
Egg yolk, 1 (beaten).
Flour, 8 oz.
Baking-powder, 2 teaspoons.
Milk, $\frac{1}{4}$ cup.

Method.—Cream butter, and add sugar and egg-yolk. Beat together and sift in the flour and baking-powder, adding alternately with half a cup of milk or sufficient to make a stiff dough. Roll out, line dish with paste, put in filling, and cover with another layer of paste. Bake at 350° F.

Carrot Recipes.

Carrot Soup.

1 pint milk.
1 cup cooked carrot, pressed through a strainer.
2 tablespoons butter.
1 tablespoon onion-juice.
1 tablespoon minced parsley, celery, or celery salt.

Method.—Heat milk, combine the other ingredients, heat them, and add them to the heated milk.

Carrot Souffle.

1 cup white sauce, medium thick.
1 cup carrots, boiled and mashed.
1 tablespoon minced onion.
2 eggs.
Salt.
Paprika.

Method.—Add the carrot, the onion, and the seasoning to the white sauce, then add the beaten egg-yolks, and beat the whites of the eggs until they are stiff. Fold them lightly into the first mixture, and turn this into a buttered baking-dish. Set the dish in a pan of hot water and bake the soufflé in a moderate oven for thirty minutes. Serve it at once from the dish in which it was cooked.

Carrot and Cheese Salad.

2 cups grated raw carrot.
 $\frac{1}{2}$ cup grated cheese.
Salt.
Paprika.

Method.—Toss the ingredients lightly together and serve them on lettuce with either French or boiled dressing.

Carrot Plum Pudding.

1 cup raw grated carrot.
1 cup raw grated potato.
 $\frac{1}{2}$ cup melted dripping.
1 cup sugar.
1 cup flour.
1 $\frac{1}{2}$ cups mixed fruit.
1 teaspoon soda.
1 teaspoon salt.
 $\frac{1}{2}$ teaspoon nutmeg.
 $\frac{1}{2}$ teaspoon cinnamon.

Method.—Prepare and grate vegetables. Measure and mix all dry ingredients, add fruit and vegetables and lastly melted fat. Steam four hours, and serve with lemon-sauce.

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J. W. Woodcock, Crop Experimentalist, Fields Division.

Justus von Liebig.

ONE of the greatest chemists of all time, Baron Justus von Liebig (1803-1873), devoted much of his learning and indefatigable industry to the chemistry of agriculture. At an early age he became Professor of Chemistry at the University of Giessen in Germany.

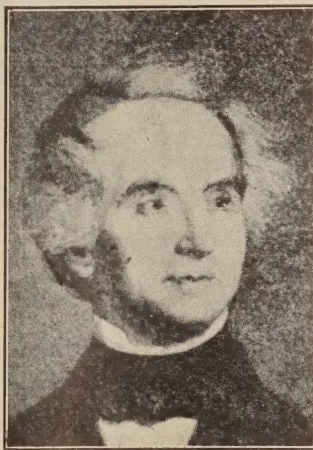
A laboratory which he established for teaching practical chemistry soon attracted students from many countries, including some British students who afterwards became famous in agricultural science, such as Dr. Henry Gilbert and Dr. Voelcker.

Application of Chemistry to Agriculture.

After writing and lecturing on other branches of chemistry Liebig turned his attention to agriculture, and his first book, "Organic Chemistry in its Application to Agriculture and Physiology," attracted much attention and led to a great deal of controversy. The chief subject of controversy was his "mineral theory," which exalted inorganic over organic manures, and he also presented a new attitude towards the functions of carbon and nitrogen.

Liebig held up to ridicule the plant physiologists of his day for their continued adhesion to the view that plants derive their carbon from the soil and not from the carbonic acid of the air. He argued that hydrogen and oxygen came from

water, and nitrogen was taken up as ammonia, which may come from the soil, from added manure, or from the air. He proved that certain mineral substances were essential—phosphates for seed for-



Justus von Liebig.

mation, and potassium for the development of grasses and cereals. By his logical arguments, fortified by experimental evidence from his laboratory, Liebig swept away many of the old ideas regarding plant nutrition.

Artificial Fertilizers.

Liebig showed that mineral manures could be used to fertilize plants, but he encountered trouble when he placed on the market patent artificial fertilizers for various crops based on chemical analyses of the desired produce. When tried in practice the manures failed, much to the detriment of the inventor's reputation.

This was particularly unfortunate, as the failure of the patent manure was not entirely the fault of Liebig's theory regarding minerals. It was rather the application of the theory into practice, and it remained for Sir John Lawes to demonstrate later just how mineral fertilizers should be used for various crops.

For instance, from the analysis of the turnip crop Liebig concluded that, as the plants contained small amounts of phosphate, only small quantities of phosphates should be applied for their development. Lawes seized upon these and other deductions, and from actual field experiments at Rothamsted showed them to be erroneous.

The controversy between Lawes and Liebig makes interesting study. It appeared to spur these two great men to produce evidence of one fact after another, and so laid the foundation of scientific manuring.

Interesting Barley Exhibit at Shows

AN interesting exhibit relating to the barley-growing industry was made by the Fields Division at recent Winter Shows.

The exhibit was designed to show the main factors which lead to the degrading of barley and its ultimate rejection for malting purposes.

The principal causes of rejection, such as broken grain, sprouted seed, skinned grain, weeds, &c., were exemplified by samples. Malt during its various phases of manufacture was exhibited, and some of the final products were on view.

The public was also given an opportunity of viewing the various apparatus used for testing barley, and the place in agriculture of the various varieties was well illustrated.



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Erratum.

In the table "Average Weight-increases (Pounds) from Inception of Experiment" on page 211 of this issue, the figures in the column "Control Group (No. 2), Ewes," should read—

15·7
28·3
30·6
21·4
11·6
16·7